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EXECUTIVE SUMMARY

1. CRITERIA FOR AN IDEAL SCIENCE CURRICULUM

> *Good science education is true to the child, true to life and true to science. This simple observation leads to the following basic criteria of validity of a science curriculum:*

(a) *Cognitive validity* requires that the content, process, language and pedagogical practices of the curriculum are age appropriate, and within the cognitive reach of the child.

(b) *Content validity* requires that the curriculum must convey significant and correct scientific content. Simplification of content, which is necessary to adapt the curriculum to the cognitive level of the learner, must not be so trivialized as to convey something basically flawed and/or meaningless.

(c) *Process validity* requires that the curriculum engage the learner in acquiring the methods and processes that lead to generation and validation of scientific knowledge, and nurture the natural curiosity and creativity of the child in science. Process validity is an important criterion since it helps the student in 'learning to learn' science.

(d) *Historical validity* requires that science curriculum be informed by a historical perspective, enabling the learner to appreciate how the concepts of science evolve with time. It also helps the learner to view science as a social enterprise and to understand how social factors influence the development of science.

(e) *Environmental validity* requires that science be placed in the wider context of the learner's environment, local and global, enabling him/her to appreciate the issues at the interface of science, technology and society and preparing him / her with the requisite knowledge and skills to enter the world of work.

(f) *Ethical validity* requires that the curriculum promote the values of honesty, objectivity, co-operation, freedom from fear and prejudice, and develop in the learner a concern for life and preservation of environment.

2. SCIENCE CURRICULUM AT DIFFERENT STAGES

Consistent with the criteria above, the objectives, content, pedagogy and assessment for different stages of the curriculum are summarized below.

At the Primary stage the child should be engaged in joyfully exploring the world around and harmonizing with it. The objectives at this stage are to nurture the curiosity of the child about the world (natural environment, artifacts and people), to have the child engage in exploratory and hands on activities to acquire the basic cognitive and psychomotor skills through observation, classification, inference, etc.; to emphasize on design and fabrication, estimation and measurement as a prelude to development of technological and quantitative skills of later stages; and to develop the basic language skills: speaking, reading and writing not only for science but also through science. Science and social science should be integrated as '*Environmental Studies*' as at present, with health as an important component. Throughout the primary stage, there should be no formal periodic tests, no awarding of grades or marks, and no detention.

At the Upper Primary stage the child should be engaged in learning principles of science through familiar experiences, working with hands to design simple technological units and modules and continuing to learn more on environment and health through activities and surveys. Scientific concepts are to be arrived at mainly from activities and experiments. Science content at this stage is not to be regarded as a diluted version of secondary school science. Group activity, discussions with peers and teachers, surveys, organization of data and their display through exhibitions, etc. in schools and neighbourhood are to be an important component of pedagogy. There should be continuous as well as periodic assessment (unit tests, term end tests). The system of 'direct' grades should be adopted. There should be no detention. Every child who attends eight years of school should be eligible to enter Class IX.

At the Secondary stage the students should be engaged in learning science as a composite discipline, in working with hands and tools to design more advanced technological modules than at the upper primary stage, and in activities and analysis on issues surrounding environment and health. Systematic experimentation as a tool to discover/verify theoretical principles, and the Scientific and Technological Literacy (STL) model of working on locally significant projects are to be important parts of the curriculum at this stage.

At the Higher Secondary stage science should be introduced as separate disciplines with emphasis on experiments/technology and problem solving. The current two streams, academic and vocational, being pursued as per NPE 1986 may require a relook in the present scenario. The students may be given an option to choose the subjects of their interest freely, though it may not be feasible to offer all the different subjects in every school. The curriculum load should be rationalized to avoid the steep gradient between secondary and higher secondary syllabus, but care should be taken not to compromise the present internationally comparable standards of our syllabus.

3. PROBLEMS AND OUTLOOK

Looking at the complex scenario of science education in India, three issues stand out unmistakably. First, science education is still far from achieving the goal of equity enshrined in our constitution. Second, science education in India, even at its best, develops competence but does not encourage inventiveness and creativity. Third, the overpowering examination system is basic to most, if not all, the fundamental problems of science education in India.

In this position paper, the Focus Group has attempted to address a range of issues related to science curriculum and problems in its implementation, but has particularly focused on the three issues mentioned above. First, we must use science curriculum as an instrument of social change to reduce the divide related to economic class, gender, caste, religion and region. We must use the textbook as one of the primary instruments for equity, since for a great majority of school going children, as also for their teachers, it is the only accessible and affordable resource for education. We must encourage alternative textbook writing in the country within the broad guidelines of the national curriculum framework. Information and Communication Technology (ICT) is also an important tool for bridging the social divides. ICT should be used in such a way that it becomes an opportunity equalizer, by providing information, communication and computing resources in remote areas.

Second, we believe that for any qualitative change from the present situation, science education in India must undergo a paradigm shift. Rote learning should be discouraged. Inquiry skills should be supported and strengthened by language, design and quantitative skills. Schools should give much greater emphasis on co-curricular and extra curricular elements aimed at stimulating investigative ability, inventiveness and creativity, even if these elements are not part of the external examination system. We strongly recommend a massive expansion of non-formal channels (for example, a truly large scale SCIENCE & TECHNOLOGY FAIR with feeder fairs at cluster/district/state levels) to encourage schools and teachers to implement this paradigm shift.

Third, we recommend nothing short of declaring examination reform as a National Mission (like other critical missions of the country), supported by funding and high quality human resources that such a mission demands. The mission should bring scientists, technologists, educationists and teachers on a common platform and launch new ways of testing students which would reduce the high level of examination related stress, curb the maddening multiplicity of entrance examinations, and research on ways of testing multiple abilities other than formal scholastic competence.

These reforms, however, fundamentally need the over arching reform of teacher empowerment. No reform, however well motivated and well planned, can succeed unless a majority of teachers feel empowered to put it in practice. With active teacher participation, the reforms suggested above could have a cascading effect on all stages of science teaching in our schools.

1. INTRODUCTION

What should science education aim at? Our engagement with this question takes us first to the more general question: what is the basic goal of education? To be brief, we can do no better than quote Gandhi: "True education is that which draws out and stimulates the spiritual, intellectual and physical faculties of the children". Implicit in this aim is the belief (that we share) that education has the potential to transform individuals and societies. What then are we looking for, as we particularize our thoughts on science education? Clearly, any discussion of the aims of science education presupposes a view of science, its methods, scope and limitations. Before we dwell on science education, we must, therefore, briefly comment on the nature of science.

1.1 NATURE OF SCIENCE

Humans have always been curious about the world around them. The inquiring and imaginative human mind has responded to the wonder and awe of nature in different ways. One kind of response from the earliest times has been to observe the physical and biological environment carefully, look for any meaningful patterns and relations, make and use new tools to interact with nature, and build conceptual models to understand the world. This human endeavour led in course of time to modern science.

Science is a dynamic, expanding body of knowledge covering ever new domains of experience. How is this knowledge generated? What is the so-called scientific method? As with many complex things in life, the scientific method is perhaps more easily discerned than defined. But broadly speaking, it involves several interconnected steps: observation, looking for regularities and patterns, making hypotheses, devising qualitative or mathematical models, deducing their consequences; verification or falsification of theories through observations and controlled experiments, and thus arriving at the principles, theories and laws governing the physical world. There is no strict order in these various steps. Sometimes, a theory may suggest a new experiment; at other times an experiment may suggest a new theoretical model. Speculation and conjecture also have a place in science, but ultimately, a scientific theory, to be acceptable, must be verified by relevant observations and/or experiments. The laws of science are never viewed as fixed eternal truths. Even the most established and universal laws of science are always regarded as provisional, subject to modification in the light of new observations, experiments and analysis.

The methodology of science and its demarcation from other fields continue to be a matter of philosophical debate. Its professed value neutrality and objectivity have been subject to critical sociological analyses. Moreover, while science is at its best in understanding simple linear systems of nature, its predictive or explanatory power is limited when it comes to dealing with non-linear complex systems of nature. Yet, with all its limitations and failings, science is unquestionably the most reliable and powerful knowledge system about the physical world known to humans.

But science is ultimately a social endeavour. Science is knowledge and knowledge is power. With power can come wisdom and liberation. Or, as sometimes happens unfortunately, power can breed arrogance and tyranny. Science has the potential to be beneficial or harmful, emancipative or oppressive. History, particularly of the twentieth century, is full of examples of this dual role of science.

How do we ensure that science plays an emancipative role in the world? The key to this lies in a consensual approach to issues threatening human survival today. This is possible only through information, transparency and a tolerance for multiple viewpoints. In a progressive forward-looking society, science can play a truly liberating role, helping people out of the vicious circle of poverty, ignorance and superstition. In a democratic political framework, the possible aberrations and misuse of science can be checked by the people themselves. Science tempered with wisdom is the surest and the only way to human welfare. This conviction provides the basic rationale for science education.

1.2 Science and Technology

An issue related to the nature of science is how to view technology. Technology is often equated to applied science and its domain is generally thought to include mechanical, electrical, optical and electronic devices and instruments, the household and commercial gadgets, applications of chemical, biological, nuclear sciences and so on. In recent times it also includes computer and telecommunication technologies. These various sub-domains of technology are, of course, interrelated. Viewing technology, especially modern technology, as applied science is, therefore, not wrong. Much of technology that we see around is indeed informed by the basic principles of science. However, technology as a discipline has its own autonomy and should not be regarded as a mere extension of science. After all, technology was part of ancient human civilizations and even prehistory, but science in its modern sense is relatively recent - only about four centuries old. In fact there is much local technological knowledge existing around the world that is in danger of extinction due to the sweeping dominance of modern technology.

Basically science is an open-ended exploration; its end results are not fixed in advance. Technology, on the other hand, is also an exploration but usually with a definite goal in mind. Of course, technology is as much a creative process as science, since there are, in principle, infinitely many ways to reach the given goal. The creativity consists in new ways of designing, planning and charting out the map to the final end, as also in innovative applications of the known principles of science. Technological solutions are guided as much by design, aesthetic, economic and other practical considerations as by scientific principles. Science is universal; technology is goal oriented and often local specific.

Our very definition of progress is linked with advances in science and technology. These advances have led to unimagined new fields of work and transformed, often beyond recognition, traditional fields like agriculture, manufacturing, construction, transport and entertainment. People today are faced with an increasingly fast-changing world where the most important skills are flexibility in adapting to new demands and creativity in taking advantage of new opportunities. These imperatives have to be kept in mind in shaping science education.

1.3 Science Education: Types of Validity

Our brief discussion on the nature of science and technology brings us now to the main question: what is our vision of true science education? There are three factors involved here: the learner (child), the environment - physical, biological and social (life) in which the learner is embedded, and the object of learning (science). We can regard good science education as one that is true to the child, true to life and true to science. This observation naturally leads to some basic criteria for validating a science curriculum, as suggested below:

a) *Cognitive validity* requires that the content, process, language and pedagogical practices of the curriculum are age appropriate, and within the cognitive reach of the child.

(b) *Content validity* requires that the curriculum must convey significant and scientifically correct content. Simplification of content, which is often necessary to adapt the curriculum to the cognitive level of the learner, must not be so trivialized as to convey something basically flawed and/or meaningless.

(c) *Process validity* requires that the curriculum engage the learner in acquiring the methods and processes that lead to generation and validation of scientific knowledge, and nurture the natural curiosity and creativity of the child. Process validity is an important criterion since it helps in 'learning to learn' science.

(d) *Historical validity* requires that science curriculum be informed by a historical perspective, enabling the learner to appreciate how the concepts of science evolve with time. It also helps the learner to view science as a social enterprise and to understand how social factors influence the development of science.

(e) *Environmental validity* requires that science be placed in the wider context of the learner's environment, local and global, enabling him/her to appreciate the issues at the interface of science, technology and society and preparing him / her with the requisite knowledge and skills to enter the world of work.

(f) *Ethical validity* requires that the curriculum promote the values of honesty, objectivity, co-operation, freedom from fear and prejudice, and develop in the learner a concern for life and preservation of environment.

2. RESEARCH IN SCIENCE EDUCATION

About 40 years ago science education came to be recognized around the world as an independent field of research. The concerns of this research are distinct from the concerns of science and those of general education. Its methods and techniques were initially borrowed from the sciences but new methods are being developed suited to the research questions[1].

Motivation for this research comes from the need to improve the practice of science education. We begin by asking, which methods of teaching work better than others? Studies in the 1970s typically compared experimental classrooms with controls. New teaching aids were tried out, lecture methods were compared with activity-based teaching, and so on. These studies gave useful results in particular contexts but it was hard to replicate them. Conditions in classrooms are varied; teacher and student characteristics too vary widely. Teaching and learning are complex, context-dependent processes and one needs to first describe this complexity in order to understand it.

before eventually aiming to control it([2]; [3]).

The early studies led to many new lines of enquiry. One line looked at the social context of teaching and learning and of the interpersonal dynamics occurring in science lessons. This kind of research has drawn on methods from sociology, linguistics and anthropology. New tools for classroom observation have reached a considerable level of sophistication ([4]; [5]). In general one knows that a supportive relationship among students and teachers, student participation in setting goals and making decisions, clear expectations and responsibilities, and opportunities for collaboration, are some factors which lead to better student outcomes [6]

Experiments are the hallmark of science, and for science learning, they are essential. In India there has been considerable work on developing simple low-cost experiments for use in schools. Research in science education has studied how students' learning follows from doing experiments or watching their demonstrations. This research was stimulated as a consequence of evaluations carried out of the "inquiry" or "discovery approach" curricula that were implemented in UK, USA and in many developing countries too in the 1960s and 1970s.

The inquiry curricula are based on an inductivist conception, in which discoveries follow directly from unbiased observations ([7], [8]). Several problems - logical, psychological and logistical - were encountered in putting the inquiry approaches to work ([9], [10], [11]). One problem was in connecting observation with inference[12]. Observations in science are usually motivated by a theory or a hypothesis. In a classroom, however, experiments are motivated by the teacher or the textbook; the students either watch or follow instructions; they are told which particular observation to focus on, and the inference is also told to them. Let us take an example. A candle is lighted and then covered with a glass. To the question, "What does this experiment show?", the common answer is, "This experiment shows that air contains oxygen" - a clearly unwarranted conclusion, but one that is often accepted in classrooms.

Clearly, for experiment based science learning to be effective, there must be space and time for teachers and students to plan experiments, discuss ideas, and critically record and analyze observations. A good pedagogy must essentially be a judicious mix of approaches, with inquiry approach being one of them.

Science learning needs the effective use of language. Psychologists know of the intimate relation between language and thought. Language is more than a way of labelling things around us; it is a tool that helps us conceptualize. Language adds meaning to, and aids in interpreting our experiences. Research on the role of language in science learning has led to better understanding of metaphor and analogy, and of how meaning is drawn from science activities. ([13], [14]).

Learning science in a second language adds a considerable burden, particularly at the primary school level[15]. Another problem is the often unnecessarily complicated language of science textbooks. Simplifying the language of textbooks has been found to improve teacher-pupil interaction in classrooms[16]

A major finding of research has been that students hold conceptions about natural phenomena, which are different from what they are told in the textbook or what they are taught by the teacher. These are not simply wrong ideas but they follow their own logic and often based on experience[17]. Across the world researchers find students believing that the material which is produced in growing plants comes from the soil: that air plays only a minor part in this process. Students imagine that matter is destroyed during burning; they think that constant motion requires a force to maintain it and that electric current is used up in lighting a bulb[18]. Such erroneous views are widespread and also highly resistant to change, even through carefully constructed teaching programmes.

Since science education is dependent on context, it is important for research to be carried out in our own environment. Studies done in India have found that tribal students' knowledge about the living world is rich and largely reflects their environment and lifestyle. In comparison, urban students' ideas about living things are shaped by knowledge gained through books and stories[19]. Conceptions about health and disease too have been found to be rooted in culture and environment[20].

Science education research has drawn from, and also contributed to, the interdisciplinary field of cognitive science[21]. Cognitive science in turn has drawn on models and methods from psychology and artificial intelligence (AI). The classical AI approach sees knowledge as stored in the form of propositions which can be represented as networks of nodes and links: i.e. concepts, and the relationships between them. This approach looks to characterize the knowledge frameworks of experts and novices and study the difference between them.

Experts perform better than novices in memory tests as well as in problem solving, but this superiority is limited to their own domain of expertise ([22], [23]). Expertise relies on methods that work very well in that domain, and not so much on general skills, which transfer between domains. Experts see and represent a physics problem at a deeper, more principled, level than do novices – e.g. they may notice that the conservation of energy is relevant in a particular situation. Novices tend to represent the same problem at a superficial level - say, as a situation involving springs or pulleys. Experts tend to have more, and more meaningful linkages between their concepts.

In the knowledge representation approach "learning", i.e. the transition from novice to expert performance, is seen as a re-structuring of students' frameworks of concepts and propositions. To test for such learning, new methods of assessment have been developed like, concept maps and semantic networks[24]. Such qualitative methods of assessment are particularly useful in obtaining feedback during the course of teaching.

In recent years assessment and evaluation have come to play a significant role within the educational system as a whole. In an atmosphere of international competition governments are seeking to build educational systems, which are responsive to national priorities. Thus large-scale systemic testing has become an important requirement for educational policy-making[25].

3. SCIENCE CURRICULUM AT THE NATIONAL LEVEL: A BRIEF HISTORY

Compulsory teaching of science, as a part of general education up to class VII or VIII, had been in practice in most of the states and UTs before the introduction of a uniform pattern of school education in 1975. During this period the subject was usually taught as general science in most of the states. However, at the secondary stage science was an optional subject, which was offered either as a combination of physical science and biology or as physics, chemistry and biology. The syllabus of science and textbooks were prescribed by the respective state agencies. The content and process of science teaching in schools, therefore, varied from one state to another.

The general objectives of science teaching identified for Classes I–VIII during the 1960s have been basic to the evolution of science education in the country, particularly at the elementary stage. The major objectives identified were:

- to acquire knowledge of biological, physical and material environments including forces of nature and simple natural phenomena, and.
- to develop scientific attitudes such as objective outlook, spirit of enquiry, truthfulness and integrity, inventiveness, accuracy and precision, avoiding hasty conclusions on insufficient data, respect for opinion of others.

The instructional material developed by the NCERT under UNICEF aided project, during 1967-70 was based on an activity-based approach to the teaching of science at the primary stage. The package of instructional material comprising syllabus, textbooks (titled "*Science is Doing*"), handbook of activities, teachers' guides, science kit and audio-visual material were developed through a process of try out on a limited number of schools. The instructional package developed for the middle schools, Classes VI to VIII, too comprised similar components and was also developed through field trials.

The Education Commission chaired by Prof. D.S. Kothari has been an important landmark for its depth and expanse of vision of education in India[26]. This led to the introduction of the 10+2+3 pattern of education in 1975. A National Curriculum Committee gave recommendations and guidelines for the new pattern through a policy document titled '*The Curriculum for the Ten-Year School - A Framework*[27]. Some of the main recommendations contained in the '*Framework*' that had a direct implication on the teaching of science, its syllabi and textbooks were:

- all subjects including science and mathematics were to be compulsory for all students up to class X, as a part of general education,
- at the primary stage, science and social sciences were to be taught as a single subject: '*Environmental Studies*',
- an integrated approach was to be followed for the teaching of science at the upper primary stage as opposed to disciplinary approach that was then in vogue, and
- science was to be considered as one composite subject at the upper primary and secondary stages.

For Classes I and II there was to be only a 'Teachers' Guide' and no textbooks, while separate textbooks in science and social studies were prepared for Classes III to V. A set of common themes was selected for teaching of '*Environmental Studies*' *(science)* in Classes I to V to follow a spiral approach for introducing the concepts in a graded manner.

The major guiding factors for the nature and scope of teaching science as an integrated course at the upper primary stage were that:

- science is one; different disciplines of science are only tentative compartmentalization of the subject to facilitate the study of its different aspects and that integrated curriculum should highlight this unified nature of science,
- curriculum should attempt to link teaching of scientific principles with daily life experiences of the learners,
- science curriculum should stress more on the processes of science than the product,
- teaching of science should lead to development of certain values,
- curriculum should provide enough opportunities to learners to attain some basic levels of scientific literacy, and
- curriculum should provide ample opportunities to the teachers to try and apply a variety of methods of teaching to suit the needs of learners of different backgrounds.

The approach adopted for the upper primary stage was extended to the secondary stage although a disciplinary approach was recommended for the latter. However, a Review Committee under the chairmanship of Sri Ishwarbhai Patel in 1977 recommended that science at the secondary stage should be offered through two equivalent alternate courses. The 'Course B' was to be a composite course in science to be taught through a single textbook. For 'Course A', it recommended a discipline orientated approach in which physics, chemistry and biology were to be taught as separate subjects. The system of alternate courses was discontinued from the academic session 1984-1985 mainly because of the perceived superiority of one course over the other.

The '*Framework*' of 1975 provided general guidelines and instructional objectives only up to the secondary stage. The responsibility of identifying aims and objectives of science teaching and the development of the syllabi and textbooks for different disciplines at the senior secondary stage was given to the curriculum developers.

The next important development was the National Policy on Education (NPE - 1986), which subsequently led to the development of the document '*National Curriculum for Primary and Secondary Education - A Frame-Work*' (NCF - 88). As before, it recommended teaching of science as a part of '*Environmental Studies*' at the primary stage. It also gave specific guidelines for the two integral components of '*Environmental Studies*', namely, science and social studies. The guidelines provided by the NCF-88 were further elaborated in a brochure titled '*Science Education for First Ten Years of Schooling - Guidelines for Upper Primary and Secondary Classes*'. The seven dimensions of science education identified in this document in fact correspond to the different criteria of validities mentioned in Sec 1.3. The teaching of science at the secondary stage was conceived for the first time as a single subject rather than three separate disciplines as had been the practice in the past. This has since been one of the major distinguishing features of the science curriculum for this stage.

The main features of the *National Curriculum Framework for School Education - 2000*[28] pertaining to science education have been:

- teaching of environmental studies as a single subject of study at the primary stage instead of environmental studies (science) and environmental studies (social science),
- teaching of '*Science and Technology*' in place of '*Science*' at the upper primary and secondary stages, so as to familiarize the learner with various dimensions of scientific and technological literacy, and
- to continue the practice of teaching science at the higher secondary stage as separate disciplines: physics, chemistry and biology.

Thus, science curriculum in India has undergone several changes, both in approach and content, during the last forty years or so. At the primary stage, teaching of science as a single subject was first replaced by *Environmental Studies (science)* and subsequently by an integrated course on *Environmental Studies*. At the upper primary stage, the disciplinary approach was replaced first by an integrated approach to science as a single subject, and finally by an approach integrating science and technology. The changes at the secondary stage too have had a similar pattern, albeit with some phase lag.

The syllabi and textbook development programmes at the state/UT level also followed curriculum renewal exercises at the national level. The instructional materials developed by the NCERT at the national level were adopted or adapted by some of the states/UTs while others evolved their own mechanisms. In some states science at the secondary stage is taught as a combination of physical science and biological or life science while in some others as physics, chemistry and biology or life science. However, compulsory teaching of science and environmental orientation to science teaching up to secondary stage has been a common feature in science curricula of all the states/UTs.

To summarize, major curriculum renewal programmes in science in India have evolved in keeping with contemporary global trends in science education and the changing societal needs. Yet this has not reflected in the actual quality of science teaching in schools. This has been mainly due to dilution of inputs at every stage of implementation, an issue that we address throughout this paper.

4. LESSONS FROM INNOVATIVE PROGRAMMES AND INTERVENTIONS

The gap perceived between recommendations of various commissions and committees and actual practice motivated several individuals and voluntary groups to take up innovative programmes on science teaching in schools.

Many of these groups had practicing scientists and academics working in collaboration with teachers and teacher associations to develop activity-based science curricula in schools. Their efforts were supported by Government institutions like the NCERT and the UGC. One of the early lessons of these efforts was that reform in evaluation had to be part of any initiative for change. Going further, a reform of science teaching should aim to comprehensively address all factors that affect the teaching-learning process.

The programmes aimed at addressing three main problems. These were: first, the sheer weight of concepts and facts taught; second, the mismatch between cognitive development of the child and the concepts taught; and third, the imbalance in teaching methods used in the classroom - there is too much emphasis on drill and rote learning and too little emphasis on observation, design, analysis, argumentation and process skills in general. A major roadblock to reforms, however, has been the public concern about the attainment levels of students in external examinations.

Several innovative programmes have been operational since the 1980s, by the Government as well as by external agencies, for reforming school education including science teaching. An example of a macro-level intervention is the *District Primary Education Programme* (DPEP) which has since been extended to the *Sarva Shiksha Abhiyan* (SSA). These interventions have been sustained over several years in identified regions of the country. In most of these, science teaching has formed part of a general thrust towards universalization of elementary education. A somewhat different approach to innovation has been taken by the Homi Bhabha Centre for Science Education (HBCSE) of the Tata Institute of Fundamental Research (TIFR), where a series of micro-level interventions as well as science popularization and talent nurture efforts have been supported by research and development of materials and methods.

The *Hoshangabad Science Teaching Programme* (HSTP) is an example of a micro level intervention at the middle school stage, which was adopted by a state Government (Madhya Pradesh, in 1978) and expanded to the macro level to run in over a thousand schools. Some of its structural innovations (e.g. cluster resource centres) were subsequently adopted by other large scale programmes. Its 30-year history shows the importance of a comprehensive curricular package comprising textbooks, kits, teacher training, school follow-up, feedback meetings and other ways of providing support to teachers, and, perhaps most importantly, examinations. A fall-out of the HSTP was the establishment of Eklavya, an NGO with a mandate of innovation in school education, whose primary programme 'Prashika' has provided inputs to other curriculum development efforts at the primary stage.

DPEP was a primary school programme initiated by the Central Govt. with multilateral funding but managed by the respective State Govts. In 1994 it covered 42 districts in seven states: Assam, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra and Tamil Nadu[29]. DPEP's scope was gradually expanded to more than 280 districts and its successor SSA now aims to cover all 593 districts of the country[30]. Lok Jumbish (LJ) was a state government programme of Rajasthan covering elementary schooling up to Class VIII, but its management was vested in an autonomous body (Lok Jumbish Parishad) set up for the purpose. The LJ programme has since been subsumed under SSA.

All of these programmes fostered an activity-based, learner-oriented pedagogy in which the child was encouraged to build on her own experiences and learn from her environment. Below we note some lessons derived from local-level assessments of these large-scale field interventions:

- Scale and intensity generate their own dynamics, which create a climate for change. Any single innovation has ripple effects that induce changes across the board. Changing the classroom methodology impacts on textbook writing, teacher training, academic back-up systems and so on. So innovations need to be viewed in a holistic - not piecemeal - manner and implemented in a mission mode.
- The mission mode calls for identifying a 'cause' with which stakeholders can identify, both emotionally and intellectually. The means include 'science caravans' and 'science melas' serving to expose people to the idea of learning science through experiments, cultural programmes, public rallies and meetings with parents and teachers. Interest in the innovation is thus generated among parents and other stakeholders.
- Teacher motivation is a crucial aspect. Motivating means reorienting teachers to the new methodology, enhancing their confidence levels, enabling them to participate at all stages of the innovation and giving them a sense of self worth and status. This is done through teachers meetings, teacher trainings and school visits.
- Broadly, two types of models are possible for in-service teacher training. One is the cascade model - training master trainers who in turn train teachers. The other model entails large-scale centralized trainings. A key aspect of training is to change the mindset among the teachers that they need not know everything and that they would be more effective facilitating learning among children than trying to be the fount of all knowledge.
- An equally important task is to get teachers to think independently, enhance their content knowledge and adopt a rigorous approach in their teaching[31]. Achieving this end, particularly through a cascade model of training, is difficult. Yet the group dynamics in trainings is such that it creates a climate for change, stimulates peer group interaction and accelerates learning.
- These programmes evolved an organizational set-up to establish interconnections at the field level. The most prevalent model included a Block Resource Centre (BRC) at the block level and a Cluster Resource Centre (CRC) at the level of a cluster of schools. Another model consisted of a Sangam Kendra, comprising a high school,

its feeder middle schools and their feeder primary schools. They enabled decentralization and provided a framework for organizing regular meetings and in-service training of teachers; follow-up visits to schools, conducting examinations, etc. It was an academic support system that permitted greater peer group interaction and exchange of ideas in the teacher community.

- Another effective mode of change comes through out-of-school creative activities including science melas, science clubs and libraries. Field-level experience shows that science teaching in schools cannot be improved significantly without such informal activities to back it up.
- Generally all the programmes succeeded in making the classrooms more participative. Teaching was no longer a one-way street. Teachers were less authoritarian, gave children greater freedom and facilitated rather than dictated learning. Children asked more questions and participated in group activities.

In summary, these interventions have shown that transforming the existing system of education is possible if upscaling of these innovative models is properly planned and executed. It would basically involve going from an exclusive delivery model to one where the community can demand and enable change. Decentralization would contribute to local relevance of curricula. Centralized approaches, however, still have their role in suggesting directions for change. These suggestions now can be based on inputs from research and development programmes.

5. AIMS OF SCIENCE EDUCATION AND ORGANISATION OF CURRICULUM AT DIFFERENT STAGES

5.1 AIMS OF SCIENCE EDUCATION

The general aims of science education follow directly from the six criteria of validity: cognitive, content, process, historical, environmental and ethical. (Sec. 1.3) To summarize, science education should enable the learner to

- know the facts and principles of science and its applications, consistent with the stage of cognitive development,
- acquire the skills and understand the methods and processes that lead to generation and validation of scientific knowledge,
- develop a historical and developmental perspective of science and to enable her to view science as a social enterprise,
- relate to the environment (natural environment, artifacts and people), local as well as global, and appreciate the issues at the interface of science, technology and society,
- acquire the requisite theoretical knowledge and practical technological skills to enter the world of work,
- nurture the natural curiosity, aesthetic sense and creativity in science and technology,
- imbibe the values of honesty, integrity, cooperation, concern for life and preservation of environment, and
- cultivate 'scientific temper'-objectivity, critical thinking and freedom from fear and prejudice..

5.2 Curriculum at different stages: objectives, content, pedagogy and assessment.

Within the frame of reference of general aims, the objectives, content, pedagogy and assessment would differ across different stages. Research in science education (Sec.2), experiences of curricula at national and state level over the past several decades (Sec.3) and different interventional programmes of voluntary groups (Sec.4) have shed considerable light on the scope and gradation of the school curriculum. While deciding on gradation of science curriculum, it must be borne in mind that a majority of students learning science as a compulsory subject up to Class X are not going to train as professional scientists or technologists in their later careers; yet they need to become 'scientifically literate', since several of the social, political and ethical issues posed by contemporary society increasingly revolve around science and technology. Consequently, science curriculum up to Class X should be oriented more towards developing awareness among the learners about the interface of science, technology and society, sensitizing them especially to the issues of environment and health and enabling them to acquire practical knowledge and skills to enter the world of work. It should stress not only the content of science, but, more importantly, the process skills of science, that is, the methods and techniques of learning science. This is necessary since the process skills are more enduring and enable the learner to cope with the ever changing and expanding a field like science and technology. Of course, this does not mean that the content can be ignored. Facts, principles, theories and their applications to understand various phenomena are at the core of science and the science curriculum must obviously engage the learner with them appropriately. However, science up to Class X should be learnt as a composite subject and not as a separate discipline such as physics, chemistry and biology. At the higher secondary stage, however, the requirements of different disciplines of science become important and they need to be learnt in depth and with rigour appropriate at that stage.

- **Primary Stage (Classes I to V)**

Primary science education has to be a phase of joyful learning for the child with ample opportunities for exploration of the environment, to interact with it and to talk about it. The main objectives at this stage are to arouse curiosity about the world (natural environment, artifacts and people) and have the child engage in exploratory and hands-on activities that lead to the development of basic cognitive and psychomotor skills through language, observation, recording, differentiation, classification, inference, drawing, illustrations, design and fabrication, estimation and measurement. The curriculum should also help the child internalize the values of cleanliness, honesty, co-operation, concern for life and environment. At the primary stage, children are actively developing their language skills – speaking, reading and writing, which is important to articulate their thoughts and develop the framework for observing the world. This is the stage, therefore, to emphasize language development through and for science learning. Learning through local language / mother tongue is the most natural; but even while teaching in the local language care should be taken not to adopt a 'purist' approach, and not to load the child with terms and words that mean nothing to the child.

The criteria for identifying the content at the primary stage are relevance, meaningfulness and interest to the child. The content should provide opportunities to deal with the real and concrete world of the children, rather than a formal abstract world. The present practice of introducing ideas and concepts pertaining to science and social science as *Environmental Studies* should be continued and further strengthened, with health education as an important component. It is, therefore, essential for the curriculum, syllabus and text book developers of both the 'sciences' and social studies' groups to work together.

The pedagogy should essentially be based on activities in and out of classroom, as well as other methods such as stories, poems, plays and other kinds of group activities. Primary school students particularly in rural areas have rich interactive experience of the natural world and the curriculum should nurture and sustain this interest. Activities should allow free exploration, seeing patterns, making comparisons and understanding the web of relationships. This would enable the child to appreciate the similarities and the differences in nature, in the sounds, the colours, the sights, the shapes, etc. Concern for environment and inculcation of related values can be promoted through activities (planting of seeds, protecting trees, not wasting water, etc.) and practices relating to health, hygiene and social interactions are best taught by example rather than through recitations from a text book. The atmosphere in the classroom should not stress the child to perform, but allow learning to take place at individual pace and permit free interaction among children and the teacher.

The present practice of not prescribing a textbook for environmental studies for Classes I and II should be continued. The teaching learning should essentially be unstructured i.e. it should not follow a predetermined sequence of content or activities. The teacher should be free to devise his/her teaching learning sequence to accomplish the overall objectives of environmental studies for this stage. There should be no formal assessment. The teachers' own observations of the child should form the assessment that is shared with the child's guardians. The progress card of the child should indicate only general observations on interests, abilities, skills, status of health, responses and other aspects of the child with no other assessment parameters. For Classes III to V, the teaching learning may be more structured, but should still continue to be based on continuous assessment. The assessment should aim at gaining greater insight into various aspects of the child's learning: language comprehension, reading ability, articulation, ability to work with hands and in groups, skills of observation, classification, drawing, and the other skills which constitute learning at this stage.

Throughout the primary stage, there should be no formal periodic tests, no awarding of grades or marks, no pass or fail criterion and, therefore, no detention. Merit ordering of students at the primary stage should be dispensed with entirely. The class teacher should be empowered to carry out continuous assessment as per well laid out guidelines.

• *Upper Primary Stage (Classes VI to VIII)*

At the upper primary stage the children are getting their first exposure to 'science'; this then is the time to bring home the right perspective of what it means to 'do science'. Science education at this stage should provide a gradual transition from environmental studies of the primary stage to elements of science and technology.

Scientific concepts to be taught at this stage should be chosen so as to make sense of everyday experiences. Though most concepts should be arrived at from activities/ experiments, a rigidly inductive approach is not necessary. It is important to ensure that a majority of activities and experiments are inexpensive and use readily available materials, so that this core component of science curriculum can be implemented in all schools including those with inadequate infrastructure. Experience has shown that experiment-based science teaching is possible and viable under diverse conditions and with a very reasonable demand on resources.

Science content at the upper primary stage should not be governed by disciplinary approach and is not to be regarded as a diluted version of secondary stage science curriculum. Technology component of science curriculum could include design and fabrication of simple models, practical knowledge about common mechanical and electrical devices and local specific technologies. It is necessary to recognize that there is a lot of diversity in the nature of technology that children from different areas of the country deal with. These differences in exposure and interest should be addressed through specific contextualized projects.

Apart from simple experiments and hands on experiences, an important pedagogic practice at this stage is to engage the students (in groups) in meaningful investigations -particularly of the problems they perceive to be significant and important. This may be done through discussions in the class with the teacher, peer interactions, gathering information from newspapers, talking to knowledgeable persons in the neighbourhood, collecting data from easily available sources and carrying out simple investigations in the design of which the students have a major role to play. Organizing information and displaying it in the class room, in the school or in the neighbourhood, or through skits and plays are an important part of the pedagogy to ensure larger participation and sharing of learning outcomes. Biographical narratives of scientists and inventors are a useful practice to inspire students at this stage.

The emphasis on the process skills of science should continue through the upper primary stage to enable children learn how to learn for themselves so that they could carry on learning even beyond school.

There should be continuous and periodic assessment (unit tests, term end tests), with much less weightage to the annual examination. At the upper primary stage, assessment should be completely internal with no external Board examination. Direct grading system should be adopted. The report card should show these grades for various components of assessment, but there should be no pass/fail grade and no detention. Every child who attends eight years of school should be eligible to enter Class IX. Merit ordering of students should be strongly discouraged.

The periodic tests should have both a written and an experimental component, with the practising teachers setting the question papers. Introducing open book-examination is one way to ensure moving away from mere information seeking questions in examinations. The examinations should assess the child's practical and problem solving skills, ability to analyze data; application of knowledge learnt; understanding of concepts; understanding, reading and making graphical representations;-and solving simple numerical exercises.

During the upper primary stage, children enter the adolescence age and they are likely to try to be free of the confines of home and parental care and assert their independence, sometimes by experimenting with smoking, drugs and sex. We need to be sensitive to their explorations of their self and body and the outside world. While science textbooks provide factual information on the human body, reproduction, safe sex, drugs, smoking, etc. this is not enough. The classroom does not provide enough scope for wider and participative discussions on sex and related matters. The school should set aside some time every week for interactions in which students can share and seek information, discuss and clarify their doubts, with teachers and, if possible, counsellors. Such a time slot should be available to students throughout the later stages of schooling also.

• *Secondary Stage (Classes IX and X)*

At the secondary stage, the beginning made at the earlier stage to introduce science as a discipline is to be further strengthened without emphasis on formal rigour. Concepts, principles and laws of science may now appear in the curriculum appropriately but stress should be on comprehension and not on mere formal definitions. The organization of science content around different themes as being practiced seems appropriate at the secondary stage, but the curricular load needs to be substantially reduced to make room for the additional elements of design and technology, and other co-curricular and extra curricular activities.

At the secondary school stage, concepts that are beyond direct experience may come to occupy an important place in the science curriculum. Since not all phenomena are directly observable, science also relies on inference and interpretation. For example, we use inference to establish the existence and properties of atoms, or the mechanism of evolution. By this time, however, students should have developed the critical ability to evaluate the epistemological status of facts that they encounter in science.

Experimentation, often involving quantitative measurement, as a tool to discover/verify theoretical principles should be an important part of the curriculum at this stage. The technological modules introduced at this stage should be more advanced than at the middle school stage. The modules should involve design, implementation using the school workshop, if possible, and testing the efficacy of the modules by qualitative and quantitative parameters. Experiments (and, as far as feasible, the technological modules) should be part of the content of the secondary stage textbook, to avoid their marginalization or neglect. However, this part of the textbook should be subject to internal assessment only. The theoretical test at this stage including that for the Class X external Board examination; should have some questions based on the experiments/technological modules included in the textbook.

Participation in co-curricular activities must be regarded as equally important at this stage. These may involve taking up projects (in consultation with teachers) that bear on local issues and involve problem-solving approach using science and technology. The various components of the science curriculum indicated above should be integrated imaginatively. The entire upper primary and secondary school curriculum should have horizontal integration and vertical continuity.

• *Higher Secondary Stage (Classes XI and XII)*

At the higher secondary stage, the present policy of two streams, academic and vocational, being pursued as per the National Policy of Education 1986 may be reviewed, so that students have an option to choose the subjects of their interest freely, though all the different subjects may not be offered by every school/ junior college.

The curriculum at this stage is recommended to be disciplinary in its approach, with appropriate rigour and depth, but care should be taken not to make the syllabus heavy. The curriculum load should be rationalized to avoid the steep gradient between secondary and higher secondary syllabus, but this should not amount to making higher

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secondary syllabus only a slightly upgraded variant of secondary stage science. The present positive feature of our syllabi being comparable to international standards should not be compromised. There should be strong emphasis on experiments, technology, and investigative projects.

Defining the appropriate advanced content for the higher secondary level is a matter of technical detail. What is clear is what it should not be. The content should not be information laden, and not aim to widely cover all aspects of the subject. Considering the vast breadth of knowledge in any subject, the exigencies of time and the student's capacity, some delimitation or rather identification of core areas has to be done. Effective science curricula have to coherently focus on important ideas within the discipline that are properly sequenced to optimize learning. The depth should ensure that the student has a basic if not rigorous understanding of the subject. Theoretical component of higher secondary science should strongly emphasise problem solving, awareness of conceptual pitfalls, and critical interrogation of different topics. Narratives giving insights on the historical development of key concepts of science should be integrated into the content judiciously. The teaching of the theoretical aspects and the experiments based on them should be closely integrated and dealt together. Some of the experiments must be open-ended, where there are no standard expected results and there is scope for making hypotheses and interpretation of results.

With our emphasis on environment friendly materials, this is the stage to introduce microchemistry as a means of experimentation for the chemistry laboratory, and possibly also for some biology laboratory work. Use of micro chemical techniques has also the advantage of lower cost and greater safety [32].

The co-curricular activities at this stage could be of several types: adopting a problem-solving approach on local issues involving science and technology; participation through creative/investigative projects in national science fairs and participation in mathematics & science Olympiads. Students should be encouraged to participate in debates and discussions on issues at the interface of science, technology and society. Though these would form an important part of the learning process they should not be included for formal assessment.

Since the curricular materials at this stage also cater to students who intend continuing in science as a career, and to sustain the enthusiasm of those who are prepared to handle more challenging materials, textbooks may carry some non-evaluative sections. In order to broaden the horizon of students for career choices available after study of a science course, it seems useful if the career options are discussed, maybe within the textbook itself.

The greater the variety of pedagogical approaches employed, broader will be the range of learners reached. The enormous potential of ICT in science pedagogy should be exploited. (Sec.6.4). The classroom atmosphere should be such that it provokes questioning, discussions and debates and enhances students' meta cognitive skills.

The experiments and technological modules should be subject to continuous internal assessment even for the final Class XII examination. The theoretical papers including those for the Class XII external examination should have some experiment/technology based test items.

To deal with the perceived redundancy of the Class XI syllabus, we could consider inclusion of syllabi of both Class XI and Class XII for assessment for awarding the higher secondary certificate. We should also explore the possibility of implementing semester system, and allowing students to write Board papers at any of two examinations in a year; this would reduce examination related stress. An important reform in this direction is to permit students to accumulate marks/credits in different subjects at their own pace and not insist on their appearing for examination in all subjects at one go.

6. GOING FROM FORM TO SUBSTANCE : ADDRESSING SOME KEY ISSUES AND CONCERNS

The overall aims and approaches of the National Curriculum Frameworks in India over the past several decades have been largely unproblematic. They evolved in consonance with contemporary trends in education worldwide. In science education the main problem has been the large gap that separates the curricular objectives and their implementation through syllabus, textbooks, classroom practices and examinations. It is important to address these concerns and formulate broad strategies so that the curriculum reforms do not simply remain 'on paper' but actually benefit the school system. We discuss some of these key issues and concerns in this section.

6.1 INFRASTRUCTURE

The aims and objectives of education as envisaged by the curriculum require a certain minimum infrastructure for their meaningful implementation. Currently the infrastructure facilities are grossly inadequate for a great majority of schools. Every school must have minimum basic facilities like a good building with adequate number of rooms, a playground, drinking water and toilet facilities. There are still many schools in the country, which do not have potable water and toilets let alone other facilities. Apart from these, science education requires some additional infrastructure.

Every primary school must have an activity room or an area where a class can assemble for individual or small-group activities. The activity room may house collections, charts, models and pictures assembled or prepared by students and teachers. Some essential equipment like hand-lenses, magnets, scissors, pen-knives and torch-light could be stored here. A large globe and models of body organs are some essential teaching aids. Puzzles, science toys, etc. could also be provided. Age-appropriate books from primary level upwards should be available to teachers and students. Teachers' resource books, popular science books, dictionaries, encyclopedias and other reference books should be provided. It may also be possible to build up a small workshop with a set of basic tools for learning techniques of design and fabrication. Children should be encouraged to draw and write by converting three sides of the classroom into a blackboard at eye-level. For the upper primary stage, the activity room should be furnished to enable children to do simple experiments, and the school must have a workshop for designing models.

The facilities need to be substantially more advanced for the secondary and senior secondary stages, with well-planned laboratories, preferably Internet and multimedia facilities (at least for teachers) and a well-stocked library containing also career information materials. If the required facilities are not immediately possible in all schools, they must be at least available at the science resource centers and in mobile laboratories at the cluster, block and district levels. We should also remember that there are rich natural and human resources available in every kind of environment which could be utilized imaginatively.

Uneven distribution of infrastructure facilities in schools creates a large divide between them compromising the basic tenet of equality of opportunity enshrined in our constitution. Lack of facilities also has had another negative consequence. It has exerted a pressure on curriculum designers and textbook writers to suit their work to the poor scenario of facilities and motivation. This in turn has led to a belief that essential facilities of space and practical work are only desirable luxuries, not essentials for science teaching. This cycle must be broken somewhere.

6.2 Syllabus, Textbooks and other Materials

Past experience shows that the ideals of a curriculum framework are greatly compromised in practice, beginning with the process of development of syllabus and textbooks. While formulating the curriculum, we should be aware that the teacher does not usually get to see the policy documents, and even if she does, she is more concerned with the textbooks that she has to use for teaching. Hence it is imperative that while preparing the curricular document, we should also prepare grounds for its translation into syllabi, textbooks and classroom processes. If we are to improve implementation we have to address several important issues.

• *Contextualization*

The basic idea of a model curriculum at the national level should only be seen as a way to set uniform general standards of education throughout the country. A common syllabus (or small variations of it) and common textbooks are certainly not to be expected for the country as a whole. School systems in different states must devise their own curriculum. The larger states particularly need to reflect their diversity in their curricula. Within the broad guidelines of the curriculum framework the syllabi and the textbooks must allow space for contextualizing and variations at the local level for all stages of school education.

There have been attempts by various groups and autonomous institutions to develop alternative curricular books. But their use on a large scale is constrained by the rigidities of the curriculum prevailing in the school system. even at the elementary stages where more autonomy and flexibility is desirable and feasible.

The state structures of producing and distributing low-cost free textbooks also remain geared for large scale printing of a single textbook. However, advances in printing technology now make it feasible to bring out several versions of a textbook to reflect regional, cultural and linguistic variations, since it is possible to keep costs low even for smaller print orders at very short notices.

• *Activity-based teaching*

Though activity-based teaching has been accepted as a paradigm for science education and is also reflected in some measure in the textbooks developed at the national and state levels, it has hardly been translated in actual classroom practice. Activities still tend to be regarded as a way to verify the ideas / principles given in the text, rather than as a means for open-ended investigations. There is a general feeling that activity based teaching is expensive, takes more time that could be otherwise 'fruitfully' used for 'text based' teaching, and does not prepare the child for examinations and competitive tests.

The concern about expenditure involved in activities/experiments cannot be dismissed. Most schools cannot afford well-equipped science laboratories. However, it is certainly possible to design low cost activities and experiments using easily available materials. Thus cost should not be allowed to become an excuse for neglecting the very base of learning science. The concern regarding examinations can be addressed by reforms in the examination system that ensure due weightage to activities and experiments. (Sec.6.5). Overall, we need to develop textbook approaches, teaching styles and assessment procedures to ensure that meaningful learning does follow from activities.

• *Content*

The most important consideration while developing a science curriculum is to ensure a reduced emphasis on mere information and provide greater exposure to what it means to practice science. The temptation for information overload stems from a concern with knowledge explosion and the need to put adequate information in a textbook. We should be wary of falling into this trap and should avoid ending up with a content-dominated curriculum that leaves insufficient time for discussion and reflection. We have already emphasized that scientific concepts introduced at any stage of the curriculum must be within the cognitive reach of the learner at that stage. While deciding content across grades we should steer away from the pipeline approach whereby some concepts get introduced too early for any meaningful understanding, on the grounds that they are required at a later stage. It must be realized that a difficult concept is not simplified merely by presenting it briefly and removing its rigour. Rather the pre-requisites in terms of ideas, experiences and activities should be provided at the appropriate levels. We should avoid also steep gradients, as currently existing between the secondary and higher-secondary stages. Finally, pedagogy cannot be decoupled from content—the two must be developed together.

In this paper we have recommended a much greater emphasis on creative expressions of students in non-formal ways both in and out of school activities, on practical work, on developing elementary technological modules, on surveys of biodiversity, health and other aspects of environment, etc. We have proposed that most of these should be exploratory / investigative activities outside the textbook. However, where naturally possible, parts of these activities should be imaginatively incorporated in textbooks.

• *Multiplicity of good textbooks*

In an ideal education system, a textbook is only one of the diverse tools for curricular transaction. In India, for the great majority of school-going children, as also for their teachers, the textbook is the only accessible and affordable curriculum resource. Consequently, we must use the textbook as one of the primary instruments for universalization of good science education in the country.

Textbooks must help realize the basic curricular objectives of different stages described in section 5. A major problem today is the practice of rote learning, largely a result of the prevailing examination system[33]. Textbooks should help counter this tendency by raising meaningful and interesting questions, and by emphasizing applications and problem-solving. They should systematically establish linkages of many kinds-with everyday experiences, within and between topics, between different curricular areas and across the years of schooling. Such linkages would form powerful reinforcers of learning.

To be fair to the past efforts in textbook-writing we must add that dealing with the various issues noted earlier is not an easy task. The problem is greatly compounded by the overpowering examination system that is discussed later. In any case, the development of a science curriculum that will satisfy the various criteria of validity given in section 1.3 is a highly challenging intellectual endeavour. Perhaps there is no single perfect solution to the problem. Perhaps there exist multiple partial solutions only, each suited to specific contexts. This is precisely why we recommend that curricular choices and textbook writing in our country should be characterized by diversity and alternative approaches. The national agencies should certainly continue their efforts to produce quality textbooks. States should be encouraged to develop multiple versions of their textbooks reflecting different local contexts; they could prepare different books for different districts, if possible. In case that is not practicable, teachers and educationists should together prepare supplementary materials at local levels that can be integrated with the materials in the textbooks in use. Alternative writing of textbooks by individuals / NGOs / institutions should be encouraged. A reliable and efficient process of accreditation of the textbooks may be required to keep a check on purely commercial interests and to promote genuine creative textbook writing in the country.

- ***Improving textbook writing procedures***

There is a need to review the way the textbooks are written by national and state agencies. First, the syllabus should evolve along with the writing of the textbooks, keeping in view its consistency with the curricular objectives. Second, there should be greater participation of teachers in the actual writing of the textbooks. Third, we must set up a practice of intensive and widespread field trials of textbooks with involvement of teachers at all stages. Field testing is essential for, among other things, a cohesive integration of activities/experiments in the science textbooks. Traditions of testing, research inputs and feedback mechanisms must be institutionalized as part of textbook development. One serious problem has been that these tasks are often performed with unrealistic deadlines leading to hasty production of books.

While the increasing use of four-colour printing is welcome, we are still far from fully realizing its potential. The best talent in designing is yet to be harnessed for producing quality textbooks. A conscious and concerted effort needs to be taken to fully exploit modern techniques of lay out, design and graphics.

Finally, textbooks at different stages should be split into suitably small sizes to avoid the physical burden of the school bag. The question of reducing other kinds of learning burden has been discussed earlier and is addressed through various recommendations in the paper.

6.3 Laboratory, Workshop and Library

A major area of concern is the gradual decline of practical work and experimentation at secondary and senior secondary levels, even while the concept of activity-based teaching is yet to become a living reality in our elementary schools. The oft-repeated recommendation of integrating experimental work and theory teaching has not been realized because of perceived lack of facilities and trained teachers in most of the schools. The degeneration of rigour in practical examinations has also lent weight to the argument to first remove them from the ambit of evaluation and then to trivialize or totally remove them from teaching practice itself. Often practical difficulties are cited as an excuse for this lack of commitment and awareness that experiment is fundamental to doing and learning science. Even well-endowed schools have tended to give only cosmetic importance to laboratory work in the prevailing scheme of things. We have already remarked that cost cannot be an excuse for neglecting experiments since it is possible to imaginatively design low cost science experiments.

Though experiments and allied activities in our system have been marginalized by the circumstance of not being externally assessed, it would be a wrong move to put them entirely within the ambit of an already dominating external examination. In this paper we have suggested a twofold approach to deal with the problem: (i) encourage practical / technological / creative components of the curriculum through non-formal channels, (ii) introduce some carefully designed experiment or technology-based questions in the theoretical paper itself. We are aware that this can only be an interim step to prevent the marginalization of experiments in school science curriculum. Ultimately, there is no alternative but to invest heavily in improving school laboratories and workshops while reducing the importance of external examinations and promoting experimental culture in our schools. We should also have computer-interfaced experiments and projects, besides projects utilizing database from public domain.

Another point of concern is the great decline in reading habit among children. Children need to be encouraged to read not only good textbooks but also a broad range of other materials to enrich their understanding. The nature of the extra curricular projects/ assignments should ensure the need for broader reading as well as an ability to search for the relevant materials. The school library should be adequately equipped to meet these requirements and schools should actively promote reading and referencing habits among children.

6.4 ICT in Science Education

Radio, and more recently television, has played a major role in the field of science communication. The SITE experiment in the mid-1970s was probably the biggest social experiment anywhere in the world that established the importance of satellite communication in the field of education.

Ever since, educational technology has come to be regarded as an important means for universalization of education in India. The widespread use of personal computers since nearly two decades ago, advances in telecommunication, and Internet a decade ago along with convergence of various technologies has, in the form of Information and Communication Technology (ICT), opened up new opportunities and challenges in the field of education.

Although the vast potential of ICT in the field of science education has been well recognized, it still remains largely untapped. The efforts have been piecemeal and sporadic. A beginning for introducing computers in the school system was made through the Computer Literacy and Studies in Schools (CLASS) project in the early 1980s. However, schools faced problems of infrastructure, appropriate software and lack of trained manpower. Today, the scenario has changed: with the increasing use of personal computers in schools, homes and workplaces, and internet connectivity, ICT shows renewed promise as a powerful tool for education, but only if these developments are complimented by making available quality software in different disciplines of science.

Appropriate multimedia software - both in English and other Indian languages - suited for various age groups in schools is still a rare commodity. Some steps have been taken by free software groups in different parts of the country to develop software localized in Indian languages. What we need now is a synergized and concerted effort in which Govt. agencies and NGOs working in this field pool their resources and expertise together. Development of software is an expensive affair and the Government should make sufficient funds available for the purpose. Software produced should be widely disseminated via Internet and CD-RoMs. Free software should be specifically promoted.

In terms of content, the Focus Group on Habitat and Learning has made a good beginning by proposing a country-wide open, transparent and publicly accessible information system on different facets of India's environment. Data on biodiversity, agriculture and health could be available here. Meteorological information could be disseminated quickly. Besides serving as a vital support for livelihood activities and disaster-management, the same system could be a rich learning resource available in far-flung areas of the country.

The Internet opens up vast possibilities; it could provide an e-platform for discussion of topics relevant to school children - both curricular and co-curricular - where students and teachers could post queries, provide answers, discuss with experts and exchange views. Innovative scientific experiments using a PC could be designed for school students through a software and hardware interface to help students to measure common physical parameters (e.g. temperature, luminosity of light, humidity, etc), and also control these parameters. Such applications would serve to introduce the role of computers in industries, laboratories, communication and so on.

Launched on 20 September 2004, EduSat provides an interactive satellite-based distance education system for the country utilizing audiovisual medium, and employing Direct-To-Home (DTH) quality broadcast. With its multiple regional beams covering different parts of India and a beam covering the Indian mainland, it is possible to establish talk-back terminals - one way video and two way audio - for interactive programmes on science education. These would provide an interactive channel for students with experts and could include talks, lectures / demonstrations, discussions, question-answer sessions, etc. Talkback terminals and receive-only terminals could be set up at selected schools that could also be utilized by other schools in the neighborhood. To fully utilize the capabilities of EduSat, necessary hardware would need to be made available and efforts strengthened to produce quality software at regional levels.

The importance of community (FM) radio in science communication needs also to be emphasized. Such low-range community radio stations could be established at selected schools and the school students encouraged in producing science programmes relevant to the local areas. The audio channels of EduSat could beam such programs over wider areas. Participation in this activity could prove to be a great incentive in learning and communicating science.

Of late, Satellite Radio has opened up the possibility of a countrywide digital audio science channel. It can cover the remotest and most interior parts of a vast country like India with the help of a specially designed satellite radio receiver. This digital satellite communication radio system uses geosynchronous communication satellites dedicated for radio broadcasts and is essentially a direct-to-home radio (currently under the name World Space Radio). Access to news, educational broadcasts, and entertainment from all around the world through its unique global relay capability are the remarkable features of this system. Since the broadcast is digital, it is possible to download data files - sound as well as picture files - into a personal computer. It is hence possible to transmit and receive slides / visuals, store them in a personal computer, and synchronize with the audio broadcast for a full fledged lecture-cum-demonstration which can be projected on to a large screen to an entire class. Two-way interactivity is possible through telephone lines. In particular, production of software is relatively easy and cheaper to produce. Satellite Radio can prove to be an important tool for science communication / education in India.

ICT as a tool should be used with care so that it serves to bridge the social divide and equalize opportunity; inappropriate and insensitive use may as easily widen the divide. Given the growing reach of the technology it is imperative that efforts are initiated to utilize ICT at the school level to prepare children to face the challenges of a society that is fast transforming into information driven society.

6.5 Examination System

In the absence of a nationally co-ordinated effort in improving assessment methods, a conservative examination system continues to dictate what happens in science classrooms across the country. Its obsession with detention has generated deep fears and complexes in generations of children with severe consequences of wastage and loss of human potential. Yet the system has acquired such a status that few dare to touch or challenge its basic premises. Its linkage with career options and social mobility has only had negative consequences and we have yet to exploit the dynamism that this linkage could give to our education system.

No doubt, the various Examination Boards of the country are involved in continuous monitoring and change in their assessment practices. But the examinations system in India occupies such a central place in our entire education system that it ought to be debated in detail at the highest policy levels, and transformed radically throughout the country.

Pending such a much-needed revolutionary reform in the examination system, we have proposed an interim strategy in this paper as follows. Introduce creative, problem-solving, practical and technological elements in the curriculum, parts of which are outside the textbook and beyond assessment of any kind, while the remaining parts are imaginatively incorporated and integrated with the formal theoretical parts of the curriculum. The activities/experiments within the textbook would continue to be assessed internally even for the Class X and Class XII examinations. That leaves only the theoretical paper of Class X and Class XII for the external Board examination. We suggest that the theoretical paper itself should have some carefully designed problems as well as experiment and technology- based questions. Some Examination Boards are contemplating such reforms and we welcome the idea.

Skeptics might regard our emphasis on non-formal creative components in the curriculum as unrealistic. 'What is not assessed at the Board examination is never taught' is the oft-repeated phrase. Still, we should not fall into the trap of putting everything we desire in the basket for external assessment. That will defeat the very purpose of introducing parts of the curriculum aimed at nurturing creativity and inventiveness. We must encourage these components by greatly strengthening and expanding non-formal co-curricular channels as recommended in section 6.6.

But if Board examinations are here to stay at least in the foreseeable future, what steps should we take to improve them? There are two major deficiencies of the current examinations in science. First the science paper does not really assess genuine understanding of the subject. It mostly has formal theoretical questions, which can be handled by rote learning without much understanding. There are hardly any good unconventional questions, no challenging problems and no truly experiment / technology based questions. Second, for logistic reasons, the Board examinations are held on fixed days and times once (or twice) a year. If a student misses say the March examination of the Board for whatever reason, it essentially means loss of a full year.

This feature coupled with the exaggerated importance attached to the external examination by students, parents and general public leads to a tremendously stressful situation for many young students - leading even to such extreme steps as suicides. Alternatively, the circumstance generates unscrupulous and dishonest practices (leakage of papers, copying in the examinations, etc.).

In the past, efforts to improve the quality of external question papers have not had any significant success. The basic reason is that the Board examination is under incredible societal pressure. In a situation, where even half a percent of score up or down can affect the career prospects of a student dramatically (or so it is perceived), any reform that is seen to jeopardize the interest of students (in getting good scores) is bound to be greatly opposed and rejected under public pressure. Another thing that compounds the problem of improving the quality of the paper is that even a minor reform, if it is to succeed, should be in, due course, accepted by all the numerous State Boards in the country, else the students from particular Board(s) would be seen to be at a relative advantage or disadvantage. But this universal acceptance of any significant reform by all the Boards is a near impossibility. In this situation the Boards at the national level can take on a leadership role. Reform might not be dramatic, but an incremental improvement in the quality of question papers is certainly possible. With all the present constraints and difficulties, questions at the external examinations can be made more meaningful and significant without necessarily increasing their difficulty level.

The second problem, namely of a one-time Board examination (for all subjects), perhaps can be handled in the future with the help of new technology. The Boards could introduce elaborate systems of on-line testing available at different times of the year. Students may write examinations in different subjects at different times and accumulate the necessary credits at their own pace – a facility that could greatly reduce examination related stress. This still does not look like an idea that can be immediately implemented and many problems of logistics and technology will need to be sorted out, but we feel the Boards may prepare themselves to think along this direction.

- **Entrance examinations after the '10 + 2' stage**

The prestigious entrance examinations of the country in engineering and medicine have high standards of testing. They test problem-solving and critical reasoning abilities very well. This is what makes the best of Indian students at the +2 stage globally competitive in events like the International Olympiads. Yet these examinations are becoming an instrument for social divide. The gap between the academic demands of a conventional Board examination paper and say of IIT-JEE is so large (even though the syllabi are comparable) that a huge coaching industry is flourishing in the country to help students bridge the gap. The high cost of coaching puts students from rural areas and poorer homes at an obvious disadvantage, denying them access to quality education at the leading engineering/medical institutes of the country. The gap between the preparation for the Board examination and that for the premier entrance tests can be reduced only if schools discourage rote learning and emphasize problem solving. To ensure that this happens in all schools, the issues of equity that is our major concern must be addressed with high priority (Sec.6.8).

There is an additional severe problem with regard to entrance examinations after the 10 + 2 stage. The country has large numbers of these entrance examinations for admission to professional courses in engineering, medicine, information technology, etc. after the '10+2' stage. In engineering, for example, besides the IIT-JEE and AIEEE, several states have their own entrance tests. In medicine we have entrance tests for AIIMS, JIPMER, AFMC, etc., besides again the medical entrance tests conducted by different states. In addition to the entrance examinations, there are other optional competitive examinations for NTSS, KVPY, Olympiads, etc. As if this was not enough, entrance and/or competitive examinations conducted by private colleges and agencies are proliferating throughout the country.

Because of the basic uncertainty about performance in any examination, most students (including very bright students) consider it prudent to appear for some half a dozen entrance tests to maximize their chance of admission to the courses/institutions they desire to join. Though a quantitative study has not been undertaken, experience indicates a good correlation between many of these examinations. For example, students who are selected for NTS or Olympiad training camps (currently through independent examinations) nearly always do very well in IIT-JEE / medical entrance exams, as also in other entrance examinations. There is then a clear case for unloading our students by reducing the number of examinations they need to write after the '10 + 2' stage. This is also necessary since excessive preoccupation with preparation for entrance tests often affects students' interest and performance in the Board examination.

• *National Testing Service*

We believe it is time to declare Examination Reform to be a National Mission (much like the other critical missions of the country) and to bring outstanding teachers, scientists and educationists on a common platform to carry out the mission. As a first step, we recommend that a comprehensive *National Testing Service* be launched. To begin with, the Testing Service could be confined only to the higher secondary stage. The proposal, if properly implemented, could have a number of beneficial effects. First, it would employ modern methods of evaluation (such as online testing) and enable students to appear for a test on a day / time of their choice. Also the students could appear for different subjects at different times and accumulate credits at their own pace. This should bring down the stress level of students considerably, as noted earlier. Second, the National Testing Service would greatly reduce the multiplicity of entrance and competitive examinations currently existing in the country. Third, and most important in the long run, the Testing Service can research on development of assessment tools for practical / technical skills, inventiveness and creativity, besides scholastic competence. A much wider range of ability and potential among students would then be tested, in contrast to the present situation. It should be clarified that this proposal is not quite the same as the National Testing Service proposed in NPE 1986.

We must, however, stress that the *National Testing Service* proposed here should be launched only if there is a commitment to treat Examination Reform as a mission supported by a funding that a critical mission deserves. The mission requires not only funding but also the services of very high quality human resources. The operational details of the proposed Testing Service would need to be carefully worked out before launching it. Additionally, consensus would need to be arrived at among the different central and state agencies for recognizing the *National Testing Service* and abandoning their own particular entrance examinations and eventually the Board examinations. Otherwise, the proposal may in fact be counter-productive, for it might add yet another examination to be cleared by students to the burgeoning list of entrance and competitive examinations already existing.

6.6 Co-curricular/Extra-curricular Activities

One of the objectives of science education is to develop inventiveness and creativity along with competence. Science education in India at its best develops competence, but does not encourage inventiveness and creativity. This is evident from the fact that many Indian students perform very well in formal / scholastic tests, but few make it to the grade of truly outstanding researchers or original thinkers. An average science student in the country demonstrates neither inventiveness nor competence in science.

Curricular transaction alone is not sufficient to provide scope for inventiveness and creativity. This is particularly so in our education system, dominated as it is by the examination system. It is in this context that non-formal modes of learning assume great significance. It is through non-formal channels that creative learning could be encouraged by providing students an environment wherein they can undertake investigative science projects, develop innovative models / exhibits, or just tinker around with gadgets and machines. In many schools this kind of activity does exist in some form such as science exhibitions / science projects. Though it often assumes the form of an annual ritual, this is the only activity that allows non-formal interaction between students and science teachers and which stimulates innovation and creativity outside the classroom, if only in a small way. We see in it a big potential and recommend that a major effort be launched to convert this activity into a large-scale children's science movement in the country.

To go ahead in this direction, it would be imperative to provide a suitable forum like science clubs at schools with basic facilities like a few simple tools, measuring instruments, and a modest library. The activities of the clubs could range from individual projects to group projects. Schools should be given suitable grants to encourage this activity, but the schoolteacher should have academic freedom in guiding students to carry out the activity in consultation with local resource persons. Teachers would need to be oriented to help children engage in such activities. Training programmes should, therefore, include sessions on the importance and organization of creative science activities. Teachers' handbooks may be prepared for the purpose listing relevant software publications, audio / video programmes, learning modules, activity kits, etc. developed by organizations engaged in innovative science education.

Science clubs could be affiliated to existing national networks of science clubs and even could play an important role in communicating science and technology to the general public by undertaking campaigns on occasions like total solar / lunar eclipses, National Science Day, etc. under the guidance of the school teachers. We emphasize that this activity should be free from student assessment - internal or external. Achievements of students in extra-curricular activities and the teachers' contribution, however, would need to be recognized suitably.

Schools should be encouraged to participate at local/state/national levels in activities like the Children's Science Congress (organized by NCSTC) and the science exhibitions (organized by NCERT and NCSM at the national and regional levels respectively). We suggest that these different agencies join hands, consolidate their efforts by sharing their resources and experiences and take steps to launch a large scale SCIENCE AND TECHNOLOGY FAIR at the national level, with smaller feeder fairs at state / local levels.

It is important to realize that co-curricular and extra curricular components should not be viewed as a marginal part of the school curriculum. In fact, in the present system of examination-dominated education in the country, it seems to be the only way to promote inventiveness and creativity. A change in mindset is, therefore, required to give the activity a big boost through massive Government support and large-scale promotional efforts involving the participation of students, teachers, teacher associations, NGOs and other stakeholders. We must take care that the activity does not degenerate into just grand annual rituals. There should be great effort on improving the quality of projects and ensuring that they are genuinely investigative and exploratory in character, and require innovation and creativity.

6.7 Teacher Empowerment

The issue of teacher empowerment has been discussed and debated for a long time. The present models of teacher preparation have not really succeeded to empower science teachers. Therefore, it is imperative to restructure the policies and practices in teacher empowerment programmes. A renewed effort towards preparation of quality teachers should gain overriding priority in the new National Curriculum Framework. This is a non-negotiable prerequisite to ensure the realization of the goals and objectives of the envisaged science curriculum.

Raising the motivational levels of the teachers has been a great challenge. Although there are no ready-made solutions to this vexed problem, we still believe it is not entirely insurmountable. Systemic improvements, better recruitment policies, increased salary grades and other material benefits and establishment of appropriate support systems will improve the situation. It will help to attract the right kind of people to the profession. Lack of confidence and motivation often result from lack of empowerment and absence of freedom. The authoritarian pressure of the higher ups, top-down models of decision making, unreasonable expectations in the name of 'accountability' and duties unrelated to teaching are compounding the problem. Teachers' voice is rarely given space in educational decision-making except as a token. There is a need to change this scenario.

A complete overhaul of the teacher education system in the country including modernization of syllabus, development of appropriate laboratories for teacher education in science and a vigorous recruitment of high quality teacher educators is the need of the hour. Teacher educators in science should have a certain minimum experience of teaching science at the appropriate level. Presently, there is no substantive mechanism for facilitating the professional development of science teacher educators. The present teacher education curriculum has a strong bias in favour of theory. A complete reformation of the teacher education curriculum should encompass the following:

- The science teacher preparation curriculum should be in consonance with changing priorities and challenges of the times. Any major change in the school science curriculum should necessarily involve concomitant changes in the teacher education curriculum. Inadequacies in the pre-service education of science teacher, cannot be compensated through in-service programmes.
- The science teacher education curriculum should be based on all the critical skills and competencies expected of science teachers.
- Science teacher preparation curriculum should emphasize process skills and methodological aspects of science, and should be informed by historical and developmental perspective of science.
- There should be a concerted move towards integrated teacher preparation programmes spread over 4-5 years.

In-service programmes too need revamping. The quality of most in-service programmes is questionable. We recommend that all in-service programmes for science teachers should be need-based. Ways and means of assessment of needs will have to be developed. Need assessment should be undertaken on a continual basis. It is practically impossible to provide in-service education to all science teachers in 'face-to-face' mode within a reasonable time frame and with limited resources. Distance learning options for teacher empowerment should be put in place. On-line courses and websites for each class level could be another potential option.

Teachers get about 60 days of vacation in a year. A good part of this should be meant for professional improvement. Most of the in-service programmes should be organized during these breaks. However, they may be compensated suitably by providing leave. Teachers should be encouraged to display self-directedness and responsibility for honing their professional competence.

One of the most important ways of teacher empowerment is to create effective systems for peer group interaction. Within-school mechanisms of mentoring and discussions between teacher colleagues should be established. Currently the interaction between colleagues tends to be largely non-academic. Science teachers could come together and form their own forum to discuss academic matters. The CRCs and BRCs could nucleate this process. Teacher manuals, magazines for science teachers, organizing seminars, symposia, exhibitions, science melas, interactions with scientists and educationists of eminence, can all contribute to the development of quality in teachers.

Teacher empowerment is the overarching reform under which all other reforms and recommendations given in this paper should be positioned. For, if we do not empower teachers, they are bound to show indifference /resistance to any new ideas, no matter how sound they look to educationists.

6.8 Equity and Science Education

Equity is the fundamental goal of any democratic society such as ours. Yet, so far, the system has failed to address the issue of quality science education 'for all' adequately. Many students come out of schools as 'scientific illiterates' or would soon lapse into this state. This is basically because many groups of students are placed in a disadvantageous position vis-à-vis learning of science. The disadvantaged groups include girls, children from rural areas, tribal and other socio-economically underprivileged children in rural as well as urban areas, those with learning difficulties and physically challenged children. Learning needs of these disadvantaged groups require greater attention. The system, in general, and the teachers in particular have to be sensitive to the needs of these diverse groups of children.

Science learning should be used as an instrument of social change to reduce the socio-economic divide. It should help to fight prejudice related to, among others, gender, caste, religion and region. Science education ought to empower students to question the social beliefs, notions and practices that perpetuate social inequality.

Given the low levels of literacy and schooling in the country, the majority of students are first generation learners. In this context education is often blamed for bringing about an alienation of the child from the family and society. However it is possible in the design of the curriculum to build close connections with the local environment and to also involve the adults in the society in the child's learning. Locally situated technology education too should serve to integrate the child into the society. Sensitivity in the choice of contexts, of equipment and pictures, could go a long way towards reducing inequality.

Ensuring access to schooling for all children is in itself not sufficient. The system must take proactive measures to ensure access to education (in this context science education) of reasonable quality. The twin objectives of access and quality should go together and never one after another.

• Towards bridging the Rural-Urban divide

There exists a huge gap in the education in general and science education in particular between the rural and urban students. The inequality, amongst other things, is mainly due to poor infrastructure, inadequate support systems, lack of access to information and other resources in rural areas, and a clear urban bias in various educational inputs. We have already emphasized that a certain minimum infrastructure and academic support in all schools is a prerequisite for good science education in the country. (Sec.6.1).

In terms of content, we should ensure that rural lifestyles are reflected in the curriculum, which can be done very effectively in contextualized curricula. Basic issues like food and water should be dealt with in the context of an agrarian economy rather than as de-contextualized isolated topics in the textbook. Various kinds of occupations engaged in by rural people, including the tools and techniques of different trades, should find place in the curriculum.

A 'rural science movement' should be initiated by organizing science programmes like demonstrations, science camps and science exhibitions at the cluster level and block level. Exhibitions on the theme of rural technologies may also be appropriate. The state departments of education through its agencies (like BRCs and CRCs) in collaboration with NGOs (wherever possible) may organize 'science camps' for rural children during vacation.

Similarly the potential of 'village radio stations' may be explored to provide opportunities for rural children to take part in 'radio science programmes'. Efforts are needed to pass on the benefits of science learning even to students who somehow happen to remain outside the school system. Rural radio science programmes may serve this objective at least partly.

Students from rural schools usually study science in their mother tongue/local language up to Class X. Many places offer +2 course in English medium only. Even where the course is offered in the local language, a level playing field rarely exists. Lack of textbooks, lack of teachers available, dearth of reference books are a few of the many problems these students encounter. This puts rural children at a great disadvantage. Special programmes to increase the competence of rural students in English are needed. Further, efforts should be strengthened not only to offer +2 science course in the local language, but also to provide the required facilities to study in the local language.

Rural children have little or no access to educational and career information in science. Guidance centres may be set up in each taluka to cater to the needs of the rural children. Similar efforts are required to provide facilities for helping rural children for competitive examinations in science.

• Gender and science education

Studies have shown that girls in the same class get science education different from boys. Science textbooks and science teachers, like others, are not free from gender bias. Science teachers too carry the same gender stereotypes as others. More discerning efforts are needed to remove gender bias from textbooks and classroom practices. Gender sensitization of teachers both at the pre-service stage and during in-service training is critical to promote gender fair science education. Further measures (including motivating the parents) are needed to encourage more girls to pursue science education and careers in science and technology.

The curriculum should strive to make the contribution of women to the field of science and technology 'visible'. Teachers should be sensitized to promote equitable classroom practices to ensure 'science experiences' of comparable quality to girls. Teachers, teacher educators, textbook writers and educational administrators are to be made sensitive and responsive to gender related issues. Studies should be undertaken to understand how gender bias operates in schools both within and outside the classrooms. Teachers should be exposed to the insights from such studies.

- ***Needs of other disadvantaged groups***

There are other sections / groups of students whose needs are unique. This is a specialized area and techniques of teaching need to evolve in consultation with the concerned experts. The system should display the courage of conviction to mobilize required resources to put in place support systems that will help these children to overcome their inadequacies in learning science in a meaningful manner. The recommendations of the focus groups concerned with these issues may be the basis for attending to the 'science needs' of these children.

We recall again that all such inequities are reflected in the high drop-out in our school system which therefore has a clear stake and responsibility in the matter.

7. RECOMMENDATIONS

For convenience, we summarize the key recommendations of this report, particularly highlighting those that in our view are either new or have received greater emphasis in this paper than before. Some of the recommendations state principles and paradigms, while some others are prescriptive in nature and focus on action.. The justification/ explanation of the various recommendations appear in the main body of the report.

7.1 Criteria of ideal science curriculum

We regard good science education as one that is true to the child, true to life and true to science. This simple and natural observation leads to six basic criteria of validity (cognitive, content, process, historical, environmental and ethical) of a science curriculum, as explained in the text. The general aims of science education follow directly from these criteria of validity.

7.2 Science curriculum at different stages

Consistent with the general aims, the objectives, content, pedagogy and assessment for different stages of the curriculum are summarized below.

At the primary stage the child should be engaged in joyfully exploring the world around and harmonizing with it. The objectives at this stage are to nurture the curiosity of the child about the world (natural environment, artifacts and people), to engage in exploratory and hands on activities to acquire the basic cognitive skills (psychomotor, observation, classification, inference, etc.); to emphasize on design and fabrication, estimation and measurement as a prelude to development of technological and quantitative skills of later stages; and to develop the basic language skills: speaking, reading and writing not only for science but also through science. Science and social science should be integrated as '*Environmental Studies*' as at present, with health as an important component. Throughout the primary stage, there should be no formal periodic tests, no awarding of grades or marks, and no detention.

At the upper primary stage the child should be engaged in learning simple principles of science through familiar experiences, in working with hands to design simple technological units and modules and in continuing to learn more on environment through activities and surveys. Scientific concepts are to be arrived at mainly from activities and experiments. Science content at this stage is not to be regarded as a diluted version of secondary stage science. Group activity, discussions with peers and teachers, surveys, organization of data and their display through exhibitions, etc. in schools and neighbourhood are to be an important component of pedagogy. There should be continuous as well as periodic assessment (unit tests, term end tests). The system of 'direct' grades should be adopted. There should be no detention. Every child who attends eight years of school should be eligible to enter Class IX.

At the secondary stage the student should be engaged in learning science as a composite discipline, in working with hands and tools to design more advanced technological modules than at the earlier stage, and in activities and analysis of environmental issues. Systematic experimentation as a tool to discover/verify theoretical principles, and the model of working on locally significant projects for Scientific and Technological Literacy (STL) are to be important parts of the curriculum at this stage.

The higher secondary stage should be devoted to disciplinary science education with emphasis on experiments/technology and problem solving. The current two streams, academic and vocational, being pursued under NPE 1986 may require relook in the present scenario; we suggest that students be given an option to choose the subjects of their interest freely from the courses offered in the two streams, though it may not be feasible to offer all the subjects in every school. The curriculum load should be rationalized to avoid the steep gradient between secondary and higher secondary syllabus, but care should be taken not to compromise the present internationally comparable standards of our syllabus.

7.3 Stimulating creativity and inventiveness in science

- Introduce a paradigm shift in science curriculum at all stages.. Emphasize exploration, inventiveness and creativity through activities, experiments, technological modules, contextualized as far as possible. Encourage implementation of co-curricular and extra curricula components through a massive expansion of existing non-formal channels such as project exhibitions, children's science congress, etc.
- In continuation of the measure above, launch a large scale SCIENCE & TECHNOLOGY FAIR at the national level for school students, with feeder events at local/district/state levels, with the objective of searching and nurturing inventive/creative talent among students. Upgrade the current activity in this regard by many orders of magnitude, through co-ordination of state & central agencies, NGO's, teacher associations, etc., financial support and mobilization of experts in the country.

- Incorporate experiments/technological modules and other parts of co-curricular components into the textbook as far as feasible, which should be subject to internal assessment (even for Class X and Class XII examinations). Other co-curricular components should be encouraged through non-formal channels as suggested before.

7.4 Textbooks

- Use the textbook as one of the primary instruments for universalization of good science education in the country, since for a great majority of school going children especially from rural areas and poor homes, as also for their teachers, it is the only accessible and affordable resource for education.

- Encourage diversity of curricular choices and alternative approaches to textbook writing in the country, within the broad guidelines of the national curriculum framework.
- Improve textbook writing procedures by the national and state agencies. Ensure greater participation of teachers in the actual writing of the books and their intensive field testing.

7.5 Examination system

- The activities/experiments/technological modules within the textbook should be assessed internally even for Class X and Class XII Board Examinations.
- The theoretical science paper for examinations including the Class X and Class XII Board examinations should have carefully designed experiment/technology-based questions, questions testing critical understanding and ability to solve problems.
- Permit students to write examinations in different subjects at different times and accumulate credits. There may be problems of logistics in implementing this idea at present, but it will reduce examination related stress to some extent.
- Reduce multiplicity of entrance examinations after the "10 + 2" stage by coordination of various central and state agencies. Launch a comprehensive *National Testing Service* (at the higher secondary stage, to begin with) as a possible way to reduce this multiplicity. **The proposal is feasible only if the different central and state agencies agree to drop their entrance examinations in favour of a common *National Testing Service*; otherwise the proposal may be counterproductive.**

7.6 Teacher empowerment

- Carry out a complete overhaul of the teacher education system in the country including modernization of syllabus and development of appropriate laboratories for teacher education in science.
- Undertake a vigorous recruitment of high quality teacher educators who must have actual experience in school teaching.
- Undertake orientation of inspectors and Govt. educational officials and sensitize them to the need for academic autonomy of teachers, without sacrificing academic accountability.
- Provide qualified and trained teachers at all stages; discontinue the scheme of para /contract teachers.

- Create systems of peer group interaction among teachers. Promote within school and between schools modes of academic exchanges between teachers.
- Discontinue the practice of giving extraneous non-academic responsibilities to teachers at the cost of their teaching duties.
- Institute schemes of incentives/awards to honour the deserving teachers.

7.7 Equity

- Use science curriculum as an instrument of social change to reduce the socio-economic divide and to help fight prejudice related to gender, caste, religion and region.
- Content of the curriculum should promote respect for diverse lifestyles, even if there is a focus on contextualization..
- Emphasise gender sensitisation of teachers both at the pre-service stage and during in-service training to promote gender fair science education.
- Use ICT as a powerful tool for bridging the social divide in education and as an opportunity equaliser.

8. OUTLOOK

For the last many decades, science education in India has been an enterprise of unresolved dichotomies and contradictions. For almost three decades now, science is a compulsory subject up to Class X throughout the country, yet this universal science education continues to be largely irrelevant to most students and its quality unacceptably poor. The over-all conceptualization of science curriculum at the national level has matured steadily and kept pace with evolving contemporary trends in science education the world over; yet this has hardly translated into any significant improvement in the actual teaching of science. There have been notable innovative efforts by several NGOs and other institutions, sometimes in collaboration with central and state agencies, yet these efforts have not qualitatively improved the mainstream science education. For an overwhelming majority of students, science is just another demanding and difficult subject to be learnt by rote, with no meaningful learning outcomes whatsoever, yet a small minority of students do come out of the system with outstanding competence in science comparable to international standards. Amidst the large number of unmotivated unprepared teachers, some do transcend the limitations of the system and become inspiring models to students. In short, there are small islands of excellence in different domains in a sea of mediocrity and irrelevance.

Looking at the complex scenario of science education in India, three issues stand out unmistakably. First, science education is still far from achieving the goal of equity enshrined in our constitution. Second, science education in India, even at its best, develops competence but does not encourage inventiveness and creativity. Third, the overpowering examination system is basic to most, if not all, the fundamental problems of science education in India.

In this position paper, the Focus Group has attempted to address a range of issues related to science curriculum and problems in its implementation, but has particularly focused on the three issues mentioned above. First, we must use science curriculum as an instrument of social change to reduce the divide related to economic class, gender, caste, religion and region. We must use the textbook as one of the primary instruments for equity, since for a great majority of school going children, as also for their teachers, it is the only accessible and affordable resource for education. We must encourage alternative textbook writing in the country within the broad guidelines of the national curriculum framework. Information and Communication Technology (ICT) is also an important tool for bridging the social divides. ICT should be used in such a way that it becomes an opportunity equalizer, by providing information, communication and computing resources in remote areas.

Second, we believe that for any qualitative change from the present situation, science education in India must undergo a paradigm shift. Rote learning should be discouraged. Inquiry skills should be supported and strengthened by language, design and quantitative skills. Schools should give much greater emphasis on co-curricular and extra curricular elements aimed at stimulating investigative ability, inventiveness and creativity, even if these elements are not part of the external examination system. We strongly recommend a massive expansion of non-formal channels (for example, a truly large scale SCIENCE & TECHNOLOGY FAIR with feeder fairs at cluster/district/state levels) to encourage schools and teachers to implement this paradigm shift.

Third, we recommend nothing short of declaring examination reform as a National Mission (like other critical missions of the country), supported by funding and high quality human resources that such a mission demands. The mission should bring scientists, technologists, educationists and teachers on a common platform and launch new ways of testing students which would reduce the high level of examination related stress, curb the maddening multiplicity of entrance examinations, and research on ways of testing multiple abilities other than formal scholastic competence.

These reforms, however, fundamentally need the over arching reform of teacher empowerment. No reform, however well motivated and well planned, can succeed unless a majority of teachers feel empowered to put it in practice. With active teacher participation, the reforms suggested above could have a cascading effect on all stages of science teaching in our schools.

REFERENCES

1 **Kelly, A. E. and Lesh, R. A. (2000)** *Handbook of Research Design in Mathematics and Science Education*. Lawrence Erlbaum Associates, Mahwah, New Jersey.

2 **White, R. (2001)** *The revolution in research on science teaching*. In Virginia Richardson (Ed.) *Handbook of Research on Teaching* (4th Edition). American Educational Research Association, Washington, D. C..

3 **Berliner, D. C. (2002)** *Educational research: the hardest science of all*. Educational Researcher, 31 (8), 18-20.

4 **Fraser, B. J. (1998)** *Science learning environments: Assessment, effects and determinants*. In Fraser, B. J. and Tobin, K. G. (Eds.) *International Handbook of Science Teaching* (Part 1). Kluwer Academic, Dodrecht, The Netherlands.

5 **Shapiro, B. (1998)** *Reading the furniture: The semiotic interpretation of science learning environments*. In Fraser, B. J. and Tobin, K. G. (Eds.) *International Handbook of Science Teaching* (Part 1). Kluwer Academic, Dodrecht, The Netherlands.

6 **Stepanek, J. (2000)** *It's Just Good Teaching*. Mathematics and Science Education Center, Northwest Regional Educational Laboratory, Portland, Oregon. http://www.nwrel.org/msec/science_inq/whatisinq.html

7 **Duschl, R. A. (1985)** *Twenty five years of mutually exclusive development: new science curricula and the philosophy of science*. *School Science and Mathematics*, Vol. LXXXV, November 1985, 541-55.

8 **Lederman, N. (1992)** *Students' and teachers' conceptions of the nature of science*: A review of research. Journal of Research in Science Teaching, 29 (4), 331-359.

9 **Driver, R. (1975)** *The name of the game*. School Science Review, 56 (197), 800-04.

10 **Wellington, J. (1981)** *What's supposed to happen sir? Some problems with discovery learning*. School Science Review, September, 167-173.

11 **Ramadas, J., Natarajan, C., Chunawala, S. and Apte, S. (1996)** *Role of Experiments in School Science. Diagnosing Learning in Primary Science* - Part 3. Homi Bhabha Centre for Science Education, Mumbai.

12 **Carey, S., Evans, R., Honda, M., Jay, E. and Ungar, C. (1989)** *An experiment is when you try it and see if it works*: A study of grade 7 students' understanding of the construction of scientific knowledge. International Journal of Science Education, 11 (5), 514-29.

13 **Vosniadou, S. and Ortony, A. (Eds.) (1989)** *Similarity and Analogical Reasoning*. Cambridge University Press, Cambridge.

14 **Sutton, C. (1992)** *Words, Science and Learning*. Open University Press, Buckingham.

15 **Sayers, R. (1992)** *Cultural and Linguistic Factors in Mathematics and Science Education*: An Annotated Bibiography. Centre for Studies in Science and Maths Education, University of Leeds.

16 **Kulkarni, V. G. and Gambhir, V. G. (1981)** *The effect of language barrier on the universalisation of education*. Indian Educational Review. January 1981.

17 **Driver, R. and Easley, J. (1978)** *Pupils and paradigms*: A review of reasearch related to concept development in adolescent science students, Studies in Science Education, 5, 61-84.

18 **Driver, R., Squires, A., Rushworth, P. and Wood-Robinson V. (1994)** *Making Sense of Secondary Science*: Research into Children's Ideas. London: Routledge.

19 **Natarajan, C., Chunawala, S., Apte, S. and Ramadas, J. (1996)** *Students' Ideas about Plants*. Diagnosing Learning in Primary Science - Part 2. Homi Bhabha Centre for Science Education, Mumbai.

20 **Mahajan, B. and Chunawala, S. (1999)** *Indian secondary students' understanding of different aspects of health.* International Journal of Science Education, 21 (11), 1155-68.

21 **Carey, S. (1986)** *Cognitive science and science education.* American Psychologist, 41 (10), 1123-1130.

22 **Chi, M. T. H., Feltovich, P. J. and Glaser, R. (1981)** *Categorization and representation of physics problems by experts and novices*, Cognitive Science, 5, 121-152.

23 **Larkin, J., McDermott, J., Simon, D. P. and Simon, H. A. (1980)** *Expert and novice performances in solving physics problems.* Science, 208, 1335-1342.

24 **Mintzes J., Wandersee, J. and Novak, J. (Eds.) (2000)** *Assessing Science Understanding: A Human Constructivist View.* Educational Psychology Series. Academic Press, San Diego, CA.

25 **Broadfoot, P. M. (1996)** *Education, Assessment and Society: A Sociological Analysis.* Open University Press, Buckingham and Philadelphia.

26 **Ministry of Education (1966)** *Education and National Development: Report of the Education Commission* 1964-66. Reprinted in 1971 by NCERT, New Delhi.

27 **NCERT (1975)** *The Curriculum for the Ten-Year School.* National Council of Educational Research and Training (NCERT), New Delhi.

28 **NCERT (2000)** *National Curriculum Framework for School Education.* National Council of Educational Research and Training (NCERT), New Delhi.

29 **Kumar, K., Priyam, M. and Saxena, S. (2001)** *Looking beyond the smokescreen*: DPEP and primary education in India. Economic and Political Weekly. EPW Special Articles, February 17, 2001.

30 **Indian NGOs (2002)** *Status of Coverage of Non-DPEP Districts Under SSA* (Revised as on 15-1-2002) http://www.indianngos.com/issue/education/govt/project2.htm

31 **Dhankar, R. (2003)** *The notion of quality in DPEP pedagogical interventions.* Education Dialogue. Volume 1:1, Monsoon 2003. 5-34.

32 **Bhanumathi,S. 1994**. *Small scale chemical techniques.* Chemistry Education (April-June) : 20-25.

33 **Ministry of HRD (1993)** *Learning Without Burden*: Report of the Advisory Committee appointed by the Ministry of Human Resource Development (MHRD), Department of Education, New Delhi.

ABBREVIATIONS

AFMC	Armed Force Medical College
AIEEE	All India Engineering Entrance Examination
AIIMS	All India Institute of Medical Sciences
BRC	Block Resource Centre
CLASS	Computer Literacy and Studies in Schools
CRC	Cluster Resource Centre
DTH	Direct-To-Home
DPEP	District Primary Education Programme
HSTP	Hoshangabad Science Teaching Programme
ICT	Information and Communication Technology
KVPY	Kishore Vaigyanik Protsahan Yojana
IIT-JEE	Indian Institute of Technology-Joint Entrance Examination
JIPMER	Jawaharlal Institute of Post-Graduate Medical Education & Research
LJ	Lok Jumbish Parishad
MHRD	Ministry of Human Resource Development
NCERT	National Council of Educational Research and Training
NCSM	National Council of Science Museum
NCSTC	National Council for Science & Technology Communication
NPE	National Policy on Education
NCF-88	National Curriculum for Primary and Secondary Education – A Frame-work
NGO	Non-Govt. Organization
NTSS	National Talent Search Scheme
SITE	Satellite Instructional Television Experiment
STL	Scientific and Technological Literacy
SSA	Sarva Shiksha Abhiyan
UNICEF	United Nations International Children's Emergency Fund
UGC	United Grants Commission
UT	Union Territory

TEACHING OF MATHEMATICS

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EXECUTIVE SUMMARY

The main goal of mathematics education in schools is the mathematization of the child's thinking. Clarity of thought and pursuing assumptions to logical conclusions is central to the mathematical enterprise. There are many ways of thinking, and the kind of thinking one learns in mathematics is an ability to handle abstractions, and an approach to problem solving.

Universalization of schooling has important implications for mathematics curriculum. Mathematics being a compulsory subject of study, access to quality mathematics education is every child's right. We want mathematics education that is affordable to every child, and at the same time, enjoyable. With many children exiting the system after Class VIII, mathematics education at the elementary stage should help children prepare for the challenges they face further in life. In our vision, school mathematics takes place in a situation where: (1) Children learn to enjoy mathematics, (2) Children learn important mathematics, (3) Mathematics is a part of children's life experience which they talk about, (4) Children pose and solve meaningful problems, (5) Children use abstractions to perceive relationships and structure, (6) Children understand the basic structure of mathematics and (7) Teachers expect to engage every child in class. On the other hand, mathematics education in our schools is beset with problems. We identify the following core areas of concern: (a) A sense of fear and failure regarding mathematics among a majority of children, (b) A curriculum that disappoints both a talented minority as well as the non-participating majority at the same time, (c) Crude methods of assessment that encourage perception of mathematics as mechanical computation, and (d) Lack of teacher preparation and support in the teaching of mathematics. Systemic problems further aggravate the situation, in the sense that structures of social discrimination get reflected in mathematics education as well. Especially worth mentioning in this regard is the gender dimension, leading to a stereotype that boys are better at mathematics than girls.

The analysis of these problems lead us to recommend: (a) Shifting the focus of mathematics education from achieving 'narrow' goals to 'higher' goals, (b) Engaging every student with a sense of success, while at the same time offering conceptual challenges to the emerging mathematician, (c) Changing modes of assessment to examine students' mathematization abilities rather than procedural knowledge, and (d) Enriching teachers with a variety of mathematical resources. The shift in focus we propose is from mathematical content to mathematical learning environments, where a a whole range of processes take precedence: formal problem solving, use of heuristics, estimation and approximation, optimization, use of patterns, visualization, representation, reasoning and proof, making connections, mathematical communication. Giving importance to these processes also helps in removing fear of mathematics from children's minds.

A crucial implication of such a shift lies in offering a multiplicity of approaches, procedures, solutions. We see this as crucial for liberating school mathematics from the tyranny of the one right answer, found by applying the one algorithm taught. Such learning environments invite participation, engage children, and offer a sense of success. In terms of assessment, we recommend that Board examinations be restructured, so that the minimum eligibility for a State certificate be numeracy, reducing the instance of failure in mathematics. On the other hand, at the higher end, we recommend that examinations be more challenging, evaluating conceptual understanding and competence. We note that a great deal needs to be done towards preparing teachers for mathematics education. A large treasury of resource material, which teachers can access freely as well as contribute to, is badly needed. Networking of school teachers among themselves as well as with university teachers will help. When it comes to curricular choices, we recommend moving away from the current structure of tall and spindly education (where one concept builds on another, culminating in university mathematics), to a broader and well-rounded structure, with many topics "closer to the ground". If accommodating processes like geometric visualization can only be done by reducing content, we suggest that content be reduced rather than compromise on the former. Moreover, we suggest a principle of postponement: in general, if a theme can be offered with better motivation and applications at a later stage, wait for introducing it at that stage, rather than go for technical preparation without due motivation. Our vision of excellent mathematical education is based on the twin premises that all students can learn mathematics and that all students need to learn mathematics. It is therefore imperative that we offer mathematics education of the very highest quality to all children.

NATIONAL FOCUS GROUP ON TEACHING OF MATHEMATICS

GOALS OF MATHEMATICS EDUCATION

What are the main goals of mathematics education in schools? Simply stated, there is one main goal— the **mathematization** of the child's thought processes. In the words of David Wheeler, it is "more useful to know how to mathematize than to know a lot of mathematics"[1].

According to George Polya, we can think of two kinds of aims for school education: a good and **narrow aim**, that of turning out employable adults who (eventually) contribute to social and economic development; and a **higher aim**, that of developing the inner resources of the growing child[2]. With regard to school mathematics, the former aim specifically relates to numeracy. Primary schools teach numbers and operations on them, measurement of quantities, fractions, percentages and ratios: all these are important for numeracy.

What about the higher aim? In developing a child's inner resources, the role that mathematics plays is mostly about thinking. Clarity of thought and pursuing assumptions to logical conclusions is central to the mathematical enterprise. There are many ways of thinking, and the kind of thinking one learns in mathematics is an ability to handle abstractions.

Even more importantly, what mathematics offers is a way of doing things: to be able to solve mathematical problems, and more generally, to have the right attitude for problem solving and to be able to attack all kinds of problems in a systematic manner.

This calls for a curriculum that is ambitious, coherent and teaches important mathematics. It should be **ambitious** in the sense that it seeks to achieve the higher aim mentioned above rather than (only) the narrower aim. It should be **coherent** in the sense that the variety of methods and skills available piecemeal (in arithmetic, algebra, geometry) cohere into an ability to address problems that come from science and social studies in high school. It should be **important** in the sense that students feel the need to solve such problems, that teachers and students find it worth their time and energy addressing these problems, and that mathematicians consider it an activity that is mathematically worthwhile. Note that such importance is not a given thing, and curriculum can help shape it. An important consequence of such requirements is that school mathematics must be **activity-oriented**.

In the Indian context, there is a centrality of concern which has an impact on all areas of school education, namely that of **universalization of schooling**. This has two important implications for the discussion on curriculum, especially mathematics. Firstly, schooling is a legal right, and mathematics being a compulsory subject of study, access to quality mathematics education is every child's right. Keeping in mind the Indian reality, where few children have access to expensive material, we want mathematics education that is affordable to every child, and at the same time, enjoyable. This implies that the mathematics taught is situated in the child's lived reality, and that for the system, it is not the subject that matters more than the child, but the other way about.

Secondly, in a country where nearly half the children drop out of school during the elementary stage, mathematics curricula cannot be grounded only on preparation for higher secondary and university education. Even if we achieve our targeted universalization goals, during the next decade, we will still have a substantial proportion of children exiting the system after Class VIII. It is then fair to ask what 8 years of school mathematics offers for such children in terms of the challenges they will face afterwards.

Much has been written about *life skills* and linkage of school education to livelihood. It is certainly true that most of the skills taught at the primary stage are useful in everyday life. However, a reorientation of the curriculum towards addressing the 'higher aims' mentioned above will make better use of the time children spend in schools in terms of the problem solving and analytical skills it builds in children, and prepare them better to encounter a wide variety of problems in life.

Our reflections on the place of mathematics teaching in the curricular framework are positioned on these twin concerns: what mathematics education can do to engage the mind of every student, and how it can strengthen the student's resources. We describe our vision of mathematics in school, attempt to delineate the core areas of concern and offer recommendations that address the concerns, based on these twin perspectives.

Many of our considerations in what follows have been shaped by discussions of Mathematics Curriculum in NCTM, USA[3], the New Jersey Mathematics Coalition[4], the Mathematics academic content standards of the California State Board of Education[5], the Singapore Mathematics Curriculum[6], the Mathematics Learning Area statements of Australia and New Zealand[7], and the national curricula of France, Hungary[8] and the United Kingdom[9]. Ferrini-Mundi et al (eds.) offer an interesting discussion comparing national curriculum and teaching practice in mathematics in France with that of Brazil, Egypt, Japan, Kenya, Sweden and the USA[10].

A VISION STATEMENT

In our vision, school mathematics takes place in a situation where:

- Children learn to *enjoy mathematics*: this is an important goal, based on the premise that mathematics can be both used and enjoyed life-long, and hence that school is best placed to create such a taste for mathematics. On the other hand, creating (or not removing) a fear of mathematics can deprive children of an important faculty for life.
- Children learn *important mathematics*: Equating mathematics with formulas and mechanical procedures does great harm. Understanding when and how a mathematical technique is to be used is always more important than recalling the technique from memory (which may easily be done using a book), and the school needs to create such understanding.

- Children see mathematics as something to talk about, to communicate, to discuss among themselves, to work together on. Making mathematics *a part of children's life experience* is the best mathematics education possible.
- Children pose and solve *meaningful problems*: In school, mathematics is the domain which formally addresses problem solving as a skill. Considering that this is an ability of use in all of one's life, techniques and approaches learnt in school have great value. Mathematics also provides an opportunity to make up interesting problems, and create new dialogues thereby.
- Children use abstractions to perceive relationships, to see structure, to reason about things, to argue the truth or falsity of statements. *Logical thinking* is a great gift mathematics can offer us, and inculcating such habits of thought and communication in children is a principal goal of teaching mathematics.
- Children understand the *basic structure of mathematics*: Arithmetic, algebra, geometry and trigonometry, the basic content areas of school mathematics, all offer a methodology for abstraction, structuration and generalization. Appreciating the scope and power of mathematics refines our instincts in a unique manner.
- **Teachers** expect to *engage every child* in class: Settling for anything less can only act towards systematic exclusion, in the long run. Adequately challenging the talented even while ensuring the participation of all children is a challenge, and offering teachers means and resources to do this is essential for the health of the system.

Such a vision is based on a diagnosis of what we consider to be the central problems afflicting school mathematics education in the country today, as also on what we perceive can be done, and ought to be done.

Before we present the vision, a quick look at the history of mathematics curricular framework is in order.

A BRIEF HISTORY

Etymologically, the term 'curriculum' which has been derived from the Latin root means 'race course'. The word race is suggestive of time and course - the path. Obviously, curriculum was seen as the prescribed course of study to be covered in a prescribed time frame. But, evolution of curriculum as a field of study began in 1890's only, albeit of the fact that thinkers of education were interested in exploring the field for centuries. Johann Friedrich Herbart (1776-1841), a German thinker, is generally associated with the evolution of curriculum- field. Herbart had emphasized the importance of 'selection' and 'organization' of content in his theories of teaching/learning. The first book devoted to the theme of curriculum entitled 'The Curriculum' was published in 1918 by Franklin Bobbitt followed by another book 'How to make Curriculum' in 1924. In 1926, the 'National society for the study of education' in America published the year book devoted to the theme of curriculum-'The Foundation and Technique of Curriculum Construction'. This way the curriculum development movement, from its beginning in 1890's, started becoming a vigorous educational movement across the world.

School systems are a relatively new phenomenon in historical terms, having developed only during the past two hundred years or so. Before then, there existed schools in parts of the West, as an appendage to religious organizations. The purpose of these schools was to produce an educated cleric. Interest in mathematics was rudimentary-'the different kinds of numbers and the various shapes and sufficient astronomy to help to determine the dates of religious rituals'. **However, in India the**

practice of education was a well established phenomenon. Arithmetic and astronomy were core components of the course of study. Astronomy was considered essential for determining auspicious times for

performing religious rituals and sacrifices. Geometry was taught because it was required for the construction of sacrificial altars and 'havan kunds' of various shapes and sizes. With the arrival of the British, the system of education underwent a major change. Western system of education was introduced to educate Indians on western lines, for the smooth functioning of the Empire.

However, much of the curriculum development in mathematics has taken place during the past thirty/forty years. This is because of the new technological revolution which has an impact on society as great as the industrial revolution. Modern technology is therefore causing, and will increasingly cause educational aims to be rethought, making curriculum development a dynamic process. To a scanning eye, mathematics itself is being directly affected by the modern technology as new branches are developed in response to new technological needs, leaving some 'time-hallowed' techniques redundant. In addition, teaching of mathematics also gets affected in order to keep pace with new developments in technology. Moreover, there exists a strong similarity of mathematics syllabi all over the world, with the result that any change which comes from the curriculum developers elsewhere is often copied or tried by others. India, for example, got swayed with the wave of new mathematics. Later, following the trends in other countries, new mathematics also receded here. To conclude, the various trends in curriculum development we observe no longer remain a static process, but a dynamic one. Its focus from 'selection' and 'organization' of the informational material shifts to the development of a curriculum that 'manifests life in its reality'.

In 1937, when Gandhiji propounded the idea of basic education, the Zakir Husain committee was appointed to elaborate on this idea. It recommended: 'Knowledge of mathematics is an essential part of any curriculum. Every child is expected to work out the ordinary calculations required in the course of his craft work or his personal and community concerns and activities.' The Secondary Education Commission appointed in 1952 also emphasised the need for mathematics as a compulsory subject in the schools.

In line with the recommendations of the National Policy on Education, 1968, when the NCERT published its "Curriculum for the Ten Year School". it remarked that the 'advent of automation and cybernatics in this century marks the beginning of the new scientific industrial revolution and makes it all the more imperative to devote special attention to the study of mathematics'. It stressed on an 'investigatory approach' in the teaching of mathematics.

The National Policy on Education 1986 went further:

Mathematics should be visualized as the vehicle to train a child to think, reason, analyze and to articulate logically. Apart from being a specific subject, it should be treated as a concomitant to any subject involving analysis and reasoning.

The NCFSE 2000 document echoes such sentiments as well. Yet, despite this history of exhortations, mathematics education has remained pretty much the same, focussed on narrow aims.

PROBLEMS IN THE TEACHING AND LEARNING OF MATHEMATICS

Any analysis of mathematics education in our schools will identify a range of issues asproblematic. We structure our understanding of these issues around the following four problems which we deem to be the core areas of concern:

1. A sense of fear and failure regarding mathematics among a majority of children,
2. A curriculum that disappoints both a talented minority as well as the non-participating majority at the same time,
3. Crude methods of assessment that encourage perception of mathematics as mechanical computation,
4. Lack of teacher preparation and support in the teaching of mathematics.

Each of these can and need to be expanded on, since they concern the curricular framework in essential ways.

FEAR AND FAILURE

If any subject area of study evokes wide emotional comment, it is mathematics. While no one educated in Tamil would profess (or at the least, not without a sense of shame) ignorance of any Tirukkural, it is quite the social norm for anyone to proudly declare that (s)he never could learn mathematics. While these may be adult attitudes, among children (who are compelled to pass mathematics examinations) there is often fear and anxiety. Mathematics anxiety and 'math phobia' are terms that are used in popular literature.[11]

In the Indian context, there is a special dimension to such anxiety. With the universalization of elementary education made a national priority, and elementary education a legal right, at this historic juncture, a serious attempt must be made to look into every aspect that alienates children in school and contributes towards their non-participation, eventually leading to their dropping out of the system. If any subject taught in school plays a significant role in alienating children and causing them to stop attending school, perhaps mathematics, which inspires so much dread, must take a big part of the blame.

Such fear is closely linked to a sense of failure. By Class III or IV, many children start seeing themselves as unable to cope with the demands made by mathematics. In high school, among children who fail only in one or two subjects in year-end exams and hence are detained, the maximum numbers fail in mathematics. This statistic pursues us right through to Class X, which is when the Indian state issues a certificate of education to a student. The largest numbers of Board Exam failures also happen in mathematics.

There are many perceptive studies and analyses on what causes fear of mathematics in schools. Central among them is the cumulative nature of mathematics. If you struggle with decimals, then you will struggle with percentages; if you struggle with percentages, then you will struggle with algebra and other mathematics subjects as well. The other principal reason is said to be the predominance of symbolic language. When symbols are manipulated without understanding, after a point, boredom and bewilderment dominate for many children, and dissociation develops.

Failure in mathematics could be read through social indicators as well. Structural problems in Indian education, reflecting structures of social discrimination, by way of class, caste and gender, contribute further to failure (and perceived failure) in mathematics education as well. Prevalent social attitudes which see girls as incapable of mathematics, or which, for centuries, have associated formal computational abilities with the upper castes, deepen such failure by way of creating self-fulfilling expectations.

A special mention must be made of problems created by the *language* used in textbooks, especially at the elementary level. For a vast majority of Indian children, the language of mathematics learnt in school is far removed from their everyday speech, and especially forbidding. This becomes a major force of alienation in its own right.

Disappointing curriculum

Any mathematics curriculum that emphasizes procedure and knowledge of formulas over understanding is bound to enhance anxiety. The prevalent practice of school mathematics goes further: a silent majority give up early on, remaining content to fail in mathematics, or at best, to see it through, maintaining a minimal level of achievement. For these children, what the curriculum offers is a store of mathematical facts, borrowed temporarily while preparing for tests.

On the other hand, it is widely acknowledged that more than in any other content discipline, mathematics is the subject that also sees great motivation and talent even at an early age in a small number of children[12]. These are children who take to quantization and algebra easily and carry on with great facility.

What the curriculum offers for such children is also intense disappointment. By not offering conceptual depth, by not challenging them, the curriculum settles for minimal use of their motivation. Learning procedures may be easy for them, but their understanding and capacity for reasoning remain under-exercised.

Crude assessment

We talked of fear and failure. While what happens in class may alienate, it never evokes panic, as does the examination. Most of the problems cited above relate to the tyranny of procedure and memorization of formulas in school mathematics, and the central reason for the ascendancy of procedure is the nature of assessment and evaluation. Tests are designed (only) for assessing a student's knowledge of procedure and memory of formulas and facts, and given the criticality of examination performance in school life, concept learning is replaced by procedural memory. Those children who cannot do such replacement successfully experience panic, and suffer failure.

While mathematics is the major ground for formal problem solving in school, it is also the only arena where children see little room for play in answering questions. Every question in mathematics is seen to have one unique answer, and either you know it or you don't. In Language, Social Studies, or even in Science, you may try and demonstrate partial knowledge, but (as the students see it), there is no scope for doing so in mathematics. Obviously, such a perception is easily coupled to anxiety.

Amazingly, while there has been a great deal of research in mathematics education and some of it has led to changes in pedagogy and curriculum, the area that has seen little change in our schools over a hundred years or more is evaluation procedures in mathematics. It is not accidental that even a quarterly examination in Class VII is not very different in style from a Board examination in Class X, and the same pattern dominates even the end-of chapter exercises given in textbooks. It is always application of some piece of information given in the text to solve a specific problem that tests use of formalism. Such antiquated and crude methods of assessment have to be thoroughly overhauled if any basic change is to be brought about.

Inadequate teacher preparation

More so than any other content discipline, mathematics education relies very heavily on the preparation that the teacher has, in her own understanding of mathematics, of the nature of mathematics, and in her bag of pedagogic techniques. Textbook-centred pedagogy dulls the teacher's own mathematics activity.

At two ends of the spectrum, mathematics teaching poses special problems. At the primary level, most teachers assume that they know all the mathematics needed, and in the absence of any specific pedagogic training, simply try and uncritically reproduce the techniques they experienced in their school days. Often this ends up perpetuating problems across time and space.

At the secondary and higher secondary level, some teachers face a different situation. The syllabi have considerably changed since their school days, and in the absence of systematic and continuing education programmes for teachers, their fundamentals in many concept areas are not strong. This encourages reliance on 'notes' available in the market, offering little breadth or depth for the students.

While inadequate teacher preparation and support acts negatively on all of school mathematics, at the primary stage, its main consequence is this: **mathematics pedagogy rarely resonates with the findings of children's psychology**. At the upper primary stage, when the language of abstractions is formalized in algebra, inadequate teacher preparation reflects as **inability to link formal mathematics with experiential learning**. Later on, it reflects as **incapacity to offer connections within mathematics or across subject areas to applications in the sciences**, thus depriving students of important motivation and appreciation.

Other systemic problems

We wish to briefly mention a few other systemic sources of problems as well. One major problem is that of **compartmentalization**: there is very little systematic communication between primary school and high school teachers of mathematics, and none at all between high school and college teachers of mathematics. Most school teachers have never even seen, let alone interacted with or consulted, research mathematicians. Those involved in teacher education are again typically outside the realm of college or research mathematics.

Another important problem is that of **curricular acceleration**: a generation ago, calculus was first encountered by a student in college. Another generation earlier, analytical geometry was considered college mathematics. But these are all part of school curriculum now. Such acceleration has naturally meant pruning of some topics: there is far less solid geometry or speherical geometry now. One reason for the narrowing is that calculus and differential equations are critically important in undergraduate sciences, technology and engineering, and hence it is felt that early introduction of these topics helps students proceeding further on these lines. Whatever the logic, the **shape of mathematics education has become taller and more spindly, rather than broad and rounded.**

While we have mentioned **gender** as a systemic issue, it is worth understanding the problem in some detail. Mathematics tends to be regarded as a 'masculine domain'. This perception is aided by the complete lack of references in textbooks to women mathematicians, the absence of social concerns in the designing of curricula which would enable children questioning received gender ideologies and the absence of reference to women's lives in problems. A study of mathematics textbooks found that in the problem sums, not a single reference was made to women's clothing, although several problems referred to the buying of cloth, etc.[13]

Classroom research also indicates a fairly systematic devaluation of girls as incapable of 'mastering' mathematics, even when they perform reasonably well at verbal as well as cognitive tasks in mathematics. It has been seen that teachers tend to address boys more than girls, which feeds into the construction of the normative mathematics learner as male. Also, when instructional decisions are in teachers' hands, their gendered constructions colour the mathematical learning strategies of girls and boys, with the latter using more invented strategies for problem-solving, which reflects greater conceptual understanding.[14] Studies have shown that teachers tend to attribute boys' mathematical 'success' more to ability, and girls' success more to effort.[15] Classroom discourses also give some indication of how the 'masculinising' of mathematics occurs, and the profound influence of gender ideologies in patterning notions of academic competence in school.[16] With performance in mathematics signifying school 'success', girls are clearly at the losing end.

THE RECOMMENDATIONS

While the litany of problems and challenges magnifies the distance we need to travel to arrive at the vision articulated above, it also offers hope by way of pointing us where we need to go and what steps we may/must take.

We summarize what we believe to be the central directions for action towards our stated vision. We group them again into four central themes:

1. Shifting the focus of mathematics education from achieving 'narrow' goals to 'higher' goals,
2. Engaging every student with a sense of success, while at the same time offering conceptual challenges to the emerging mathematician,
3. Changing modes of assessment to examine students' mathematization abilities rather than procedural knowledge,
4. Enriching teachers with a variety of mathematical resources.

There is some need for elaboration. How can the advocated shift to 'higher' goals remove fear of mathematics in children? Is it indeed possible to simultaneously address the silent majority and the motivated minority? How indeed can we assess processes rather than knowledge? We briefly address these concerns below.

Towards the higher goals

The shift that we advocate, from 'narrow' goals to 'higher' goals, is best summarized as a shift in focus from mathematical content to mathematical learning environments.

The content areas of mathematics addressed in our schools do offer a solid foundation. While there can be disputes over what gets taught at which grade, and over the level of detail included in a specific theme, there is broad agreement that the content areas (arithmetic, algebra, geometry, mensuration, trigonometry, data analysis) cover essential ground.

What can be levelled as major criticism against our extant curriculum and pedagogy is its failure with regard to mathematical processes. We mean a whole range of processes here: formal problem solving, use of heuristics, estimation and approximation, optimization, use of patterns, visualization, representation, reasoning and proof, making connections, mathematical communication. Giving importance to these processes constitutes the difference between doing mathematics and swallowing mathematics, between mathematization of thinking and memorizing formulas, between trivial mathematics and important mathematics, between working towards the narrow aims and addressing the higher aims.

In school mathematics, certainly emphasis does need to be attached to factual knowledge, procedural fluency and conceptual understanding. New knowledge is to be constructed from experience and prior knowledge using conceptual elements. However, invariably, emphasis on procedure gains ascendancy at the cost of conceptual understanding as well as construction of knowledge based on experience. This can be seen as a central cause for the fear of mathematics in children.

On the other hand, the emphasis on exploratory problem solving, activities and the processes referred to above constitute learning environments that invite participation, engage children, and offer a sense of success. Transforming our classrooms in this manner, and designing mathematics curricula that enable such a transformation is to be accorded the highest priority.

Processes

It is worth explaining the kind of processes we have referred to and their place in the curricular framework. Admittedly, such processes cut across subject areas, but we wish to insist that they are central to mathematics. This is to be seen in contrast with mathematics being equated to exact but abstruse knowledge with an all-or-nothing character.

Formal problem solving, at least in schools, exists only in the realm of mathematics. But for physics lessons in the secondary stage and after, there are no other situations outside of mathematics where children address themselves to problem solving. Given this, and the fact that this is an important 'life skill' that a school can teach, mathematics education needs to be far more conscious of what tactics it can offer. As it stands, problem solving only amounts to doing exercises that illustrate specific definitions in the text. Worse, textbook problems reduce solutions to knowledge of specific tricks, of no validity outside the lesson where they are located.

On the other hand, many *general tactics* can indeed be taught, progressively during the stages of school. Techniques like abstraction, quantification, analogy, case analysis, reduction to simpler situations, even guess-and-verify, are useful in many problem contexts. Moreover, when children learn a variety of approaches (over time), their toolkit gets richer and they also learn which approach is best when.

This brings us to the use of **heuristics**, or rules of thumb. Unfortunately, mathematics is considered to be 'exact' where one uses 'the appropriate formula'. To find a property of some triangle, it is often useful to first investigate the special case when the triangle is right angled, and then look at the general case afterwards. Such heuristics do not always work, but when they do, they give answers to many other problems as well. Examples of heuristics abound when we apply mathematics in the sciences. Most scientists, engineers and mathematicians use a big bag of heuristics – a fact carefully hidden by our school textbooks.

Scientists regard **estimation of quantities** and **approximating solutions**, when exact ones are not available, to be absolutely essential skills. The physicist Fermi was famous for posing estimation problems based on everyday life and showing how they helped in nuclear physics. Indeed, when a farmer estimates the yield of a particular crop, considerable skills in estimation and approximation are used. School mathematics can play a significant role in developing and honing such useful skills, and it is a pity that this is almost entirely ignored.

Optimization is never even recognized as a skill in schools. Yet, when we wish to decide on a set of goods to purchase, spending less than a fixed amount, we optimize Rs. 100 can buy us A and B or C, D and E in different quantities, and we decide. Two different routes can take us to the same destination and each has different advantages or disadvantages. Exact solutions to most optimization problems are hard, but **intelligent choice based on best use of available information** is a mathematical skill that can be taught. Often, the numerical or geometrical facility needed is available at the upper primary stage. Developing a series of such situations and abilities can make school mathematics enjoyable as well as directly useful.

Visualization and **representation** are again skills unaddressed outside mathematics curriculum, and hence mathematics needs to develop these far more consciously than is done now. Modelling situations using quantities, shapes and forms is the best use of mathematics. Such representations aid visualization and reasoning, clarify essentials, help us discard irrelevant information. Rather sadly, representations are taught as ends in themselves. For example, equations are taught, but the use of an equation to represent the relationship between force and acceleration is not examined. What we need are illustrations that show a multiplicity of representations so that the relative advantages can be understood. For example, a fraction can be written in the form p/q but can also be visualized as a point on the number line; both representations are useful, and appropriate in different contexts. Learning this about fractions is far more useful than arithmetic of fractions.

This also brings us to the need for **making connections**, within mathematics, and between mathematics and other subjects of study. Children learn to draw graphs of functional relationships between data, but fail to think of such a graph when encountering equations in physics or chemistry. That algebra offers a language for succinct substitutable statements in science needs underlining and can serve as motivation for many children. Eugene Wigner once spoke of the unreasonable effectiveness of mathematics in the sciences. Our children need to appreciate the fact that mathematics is an effective instrument in science.

The importance of **systematic reasoning** in mathematics cannot be overemphasized, and is intimately tied to notions of aesthetics and elegance dear to mathematicians. Proof is important, but equating proof with deduction, as done in schools, does violence to the notion. Sometimes, a picture suffices as a proof, a construction proves a claim rigorously. The social notion of proof as a process that convinces a sceptical adversary is important for the practice of mathematics. Therefore, school mathematics should encourage proof as a systematic way of argumentation. The aim should be to develop arguments, evaluate arguments, make and investigate conjectures, and understand that there are various methods of reasoning.

Another important element of process is **mathematical communication**. Precise and unambiguous use of language and rigour in formulation are important characteristics of mathematical treatment, and these constitute values to be imparted by way of mathematics education. The use of jargon in mathematics is deliberate, conscious and stylized. Mathematicians discuss what is appropriate notation since good notation is held to aid thought. As children grow older, they should be taught to appreciate the significance of such conventions and their use. For instance, this means that setting up of equations should get as much coverage as solving them.

In discussing many of these skills and processes, we have repeatedly referred to offering a *multiplicity* of approaches, procedures, solutions. We see this as crucial for liberating school mathematics from the tyranny of the one right answer, found by applying the one algorithm taught. When many ways are available, one can compare them, decide which is appropriate when, and in the process gain insight. And such a multiplicity is available for most mathematical contexts, all through school, starting from the primary stage. For instance, when we wish to divide 102 by 8, we could do long division, or try 10 first, then 15, and decide that the answer lies in between and work at narrowing the gap.

It is important to acknowledge that mathematical competence is situated and shaped by the social situations and the activities in which learning occurs. Hence, school mathematics has to be in close relation to the social worlds of children where they are engaged in mathematical activities as a part of daily life. Open-ended problems, involving multiple approaches and not solely based on arriving at a final, unitary, correct answer are important so that an external source of validation (the teacher, textbooks, guidebooks) is not habitually sought for mathematical claims. The unitary approach acts to disadvantage all learners, but often acts to disadvantage girls in particular.

Mathematics that people use

An emphasis on the processes discussed above also enables children to appreciate the relevance of mathematics to people's lives. In Indian villages, it is commonly seen that people who are not formally educated use many modes of mental mathematics. What may be called *folk algorithms* exist for not only mentally performing number operations, but also for measurement, estimation, understanding of shapes and aesthetics. Appreciating the richness of these methods can enrich the child's perception of mathematics. Many children are immersed in situations where they see and learn the use of these methods, and relating such knowledge to what is formally learnt as mathematics can be inspiring and additionally motivating.

For instance, in Southern India, **kolams** (complex figures drawn on the floor using a white powder, similar to *rangoli* in the north, but ordinarily without colour) are seen in front of houses. A new kolam is created each day and a great variety of kolams are used. Typically women draw kolams, and many even participate in competitions. The grammar of these kolams, the classes of closed curves they use, the symmetries that they exploit - these are matters that mathematics education in schools can address, to the great benefit of students. Similarly, art, architecture and music offer intricate examples that help children appreciate the cultural grounding of mathematics.

Use of technology

Technology can greatly aid the process of mathematical exploration, and clever use of such aids can help engage students. Calculators are typically seen as aiding arithmetical operations; while this is true, calculators are of much greater pedagogic value. Indeed, if one asks whether calculators should be permitted in examinations, the answer is that it is quite unnecessary for examiners to raise questions that necessitate the use of calculators. On the contrary, in a non-threatening atmosphere, children can use calculators to study iteration of many algebraic functions. For instance, starting with an arbitrary large number and repeatedly finding the square root to see how soon the sequence converges to 1, is illuminating. Even phenomena like chaos can be easily comprehended with such iterators.

If ordinary calculators can offer such possibilities, the potential of graphing calculators and computers for mathematical exploration is far higher. However, these are expensive, and in a country where the vast majority of children cannot afford more than one notebook, such use is luxurious. It is here that governmental action, to provide appropriate alternative low-cost technology, may be appropriate. Research in this direction will be greatly beneficial to school education.

It must be understood that there is a spectrum of technology use in mathematics education, and calculators or computers are at one end of the spectrum. While notebooks and blackboards are the other end, use of graph paper, geo boards, abacus, geometry boxes etc. is crucial. Innovations in the design and use of such material must be encouraged so that their use makes school mathematics enjoyable and meaningful.

Mathematics for all

A systemic goal that needs to be underlined and internalized in the entire system is universal inclusion. This means acknowledging that forms of social discrimination work in the context of mathematics education as well and addressing means for redress. For instance, gendered attitudes which consider mathematics to be unimportant for girls, have to be systematically challenged in school. In India, even caste based discrimination manifests in such terms, and the system cannot afford to treat such attitudes by default.

Inclusion is a fundamental principle. Children with special needs, especially children with physical and mental disabilities, have as much right as every other child to learn mathematics, and their needs (in terms of pedagogy, learning material etc) have to be addressed seriously. The conceptual world of mathematics can bring great joy to these children, and it is our responsibility not to deprive them of such education.

One important implication in taking Mathematics for **all** seriously is that even the *language used in our textbooks* must be sensitive to language uses of all children. This is critical for primary education, and this may be achievable only by a multiplicity of textbooks.

While the emphasized shift towards learning environments is essential for engaging the currently nonparticipating majority in our classrooms, it does not in any way mean dilution of standards. We are not advising here that the mathematics class, rather than boring the majority, ends up boring the already motivated minority. On the other hand, a case can be made that such open problem situations offer greater gradations in challenges, and hence offer more for these few children as well.

It is widely acknowledged that mathematical talent can be detected early, in a way that is not observable in more complex fields such as literature and history. That is, it is possible to present challenging tasks to highly talented youngsters. The history of the task may be ignored; the necessary machinery is minimal; and the manner in which such youngsters express their insights does not require elaboration in order to generate mathematical inquiry.

All this is to say that challenging all children according to their mathematical taste is indeed possible. But this calls for systemic mechanisms, especially in textbooks. In India, few children have access to any mathematical material outside their mathematics textbooks, and hence structuring textbooks to offer such a variety of content is important.

In addition, we also need to consider mechanisms for identification and nurturing of such talent, especially in rural areas, by means of support outside main school hours. Every district needs at least a few centres accessible to children in the district where such mathematical activity is undertaken periodically. Networking such talent is another way of strengthening it.

Assessment

Given that mathematics is a compulsory subject in all school years, all summative evaluation must take into account the concerns of universalization. Since the Board examination for Class X is for a certificate given by the State, implications of certified failure must be considered seriously. Given the reality of the educational scenario, the fact that Class X is a terminal point for many is relevant; applying the same single standard of assessment for these students as well as for rendering eligibility for the higher secondary stage seems indefensible. When we legally bind all children to complete ten years of schooling, the SSLC certificate of passing that the State issues should be seen as a basic requirement rather than a certificate of competence or expertise.

Keeping these considerations in mind, and given the high failure rate in mathematics, we suggest that the Board examinations be restructured. They must ensure that all numerate citizens pass and become eligible for a State certificate. (What constitutes numeracy in a citizen may be a matter of social policy.) Nearly half the content of the examination may be geared towards this.

However, the rest of the examination needs to challenge students far more than it does now, emphasizing competence and expertise rather than memory. Evaluating conceptual understanding rather than fast computational ability in the Board examinations will send a signal of intent to the entire system, and over a period of time, cause a shift in pedagogy as well.

These remarks pertain to all forms of summative examinations at the school level as well. Multiple modes of assessment, rather than the unique test pattern, need to be encouraged. This calls for a great deal of research and a wide variety of assessment models to be created and widely disseminated.

Teacher support

The systemic changes that we have advocated require substantial investments of time, energy, and support on the part of teachers. Professional development, affecting the beliefs, attitudes, knowledge, and practices of teachers in the school, is central to achieving this change. In order for the vision described in this paper to become a reality, it is critical that professional development focuses on mathematics specifically. Generic 'teacher training' does not provide the understanding of content, of instructional techniques, and of critical issues in mathematics education that is needed by classroom teachers.

There are many mechanisms that need to be ensured to offer better teacher support and professional development, but the essential and central requirement is that of a large treasury of resource material which teachers can access freely as well as contribute to. Further, networking of teachers so that expertise and experience can be shared is important. In addition, identifying and nurturing resource teachers can greatly help the process. Regional mathematics libraries may be built to act as resource centres.

An important area of concern is the teacher's own perception of what mathematics is, and what constitute the goals of mathematics education. Many of the processes we have outlined above are not considered to be central by most mathematics teachers, mainly because of the way they were taught and a lack of any later training on such processes.

Offering a range of material to teachers that enriches their understanding of the subject, provides insights into the conceptual and historical development of the subject and helps them innovate in their classrooms is the best means of teacher support. For this, providing channels of communication with college teachers and research mathematicians will be of great help. When teachers network among themselves and link up with teachers in universities, their pedagogic competence will be strengthened immensely. Such systematic sharing of experience and expertise can be of great help.

CURRICULAR CHOICES

Acknowledging the existence of choices in curriculum is an important step in the institutionalization of education. Hence, when we speak of shifting the focus from content to learning environments, we are offering criteria by which a curriculum designer may resolve choices. For instance, visualization and geometric reasoning are important processes to be ensured, and this has implications for teaching algebra. Students who 'blindly' manipulate equations without being able to visualize and understand the underlying geometric picture cannot be said to have understood. If this means greater coverage for geometric reasoning (in terms of lessons, pages in textbook), it has to be ensured. Again, if such expansion can only be achieved by reducing other (largely computational) content, such content reduction is implied.

Below, while discussing stage-wise content, we offer many such inclusion / exclusion criteria for the curriculum designer, emphasizing again that the recommendation is not to dilute content, but to give importance to a variety of processes. Moreover, we suggest a principle of postponement: in general, if a theme can be offered with better motivation and applications at a later stage, wait for introducing it at that stage, rather than go for technical preparation without due motivation. Such considerations are critical at the secondary and higher secondary stages where a conscious choice between breadth and depth is called for.

Here, a quotation from William Thurston is appropriate:

The long-range objectives of mathematics education would be better served if the tall shape of mathematics were de-emphasized, by moving away from a standard sequence to a more diversified curriculum with more topics that start closer to the ground. There have been some trends in this direction, such as courses in finite mathematics and in probability, but there is room for much more.[17]

Primary stage

Any curriculum for primary mathematics must incorporate the progression from the concrete to the abstract and subsequently a need to appreciate the importance of abstraction in mathematics. In the lowest classes, especially, it is important that activities with concrete objects form the first step in the classroom to enable the child to understand the connections between the logical functioning of their everyday lives to that of mathematical thinking.

Mathematical games, puzzles and stories involving number are useful to enable children to make these connections and to build upon their everyday understandings. Games – not to be confused with open-ended play - provide non-didactic feedback to the child, with a minimum amount of teacher intervention[18]. They promote processes of anticipation, planning and strategy.

Mathematics is not just arithmetic

While addressing number and number operations, due place must be given to non-number areas of mathematics. These include shapes, spatial understanding, patterns, measurement and data handling. It is not enough to deal with shapes and their properties as a prelude to geometry in the higher classes. It is important also to build up a vocabulary of relational words which extend the child's understanding of space. The identification of patterns is central to mathematics. Starting with simple patterns of repeating shapes, the child can move on to more complex patterns involving shapes as well as numbers. This lays the base for a mode of thinking that can be called algebraic. A primary curriculum that is rich in such activities can arguably make the transition to algebra easier in the middle grades.[19] Data handling, which forms the base for statistics in the higher classes, is another neglected area of school mathematics and can be introduced right from Class I.

Number and number operations

Children come equipped with a set of intuitive and cultural ideas about number and simple operations at the point of entry into school. These should be used to make linkages and connections to number understanding rather than treating the child as a tabula rasa. To learn to think in mathematical ways children need to be logical and to understand logical rules, but they also need to learn conventions needed for the mastery of mathematical techniques such as the use of a base ten system. Activities as basic as counting and understanding numeration systems involve logical understandings for which children need time and practice if they are to attain mastery and then to be able to use them as tools for thinking and for mathematical problem solving[20]. Working with limited quantities and smaller numbers prevents overloading the child's cognitive capacity which can be better used for mastering the logical skills at these early stages.

Operations on natural numbers usually form a major part of primary mathematics syllabi. However, the standard algorithms of addition, subtraction, multiplication and division of whole numbers in the curriculum have tended to occupy a dominant role in these. This tends to happen at the expense of development of number sense and skills of estimation and approximation. The result frequently is that students, when faced with word problems, ask "Should I add or subtract? Should I multiply or divide?" This lack of a conceptual base continues to haunt the child in later classes. All this strongly suggests that operations should be introduced contextually. This should be followed by the development of language and symbolic notation, with the standard algorithms coming at the end rather than the beginning of the treatment.

Fractions and decimals

Fractions and decimals constitute another major problem area. There is some evidence that the introduction of operations on fractions coincides with the beginnings of fear of mathematics. The content in these areas needs careful reconsideration. Everyday contexts in which fractions appear, and in which arithmetical operations need to be done on them, have largely disappeared with the introduction of metric units and decimal currency. At present, the child is presented with a number of contrived situations in which operations have to be performed on fractions. Moreover, these operations have to be done using a set of rules which appear arbitrary (often even to the teacher), and have to be memorized - this at a time when the child is still grappling with the rules for operating on whole numbers. While the importance of fractions in the conceptual structure of mathematics is undeniable, the above considerations seem to suggest that less emphasis on operations with fractions at the primary level is called for.[21]

Upper primary stage

Mathematics is amazingly compressible: one may struggle a lot, work out something, perhaps by trying many methods. But once it is understood, and seen as a whole, it can be filed away, and used as just a step when needed. The insight that goes into this compression is one of the great joys of mathematics. A major goal of the upper primary stage is to introduce the student to this particular pleasure.

The compressed form lends itself to application and use in a variety of contexts. Thus, mathematics at this stage can address many problems from everyday life, and offer tools for addressing them. Indeed, the transition from arithmetic to algebra, at once both challenging and rewarding, is best seen in this light.

Arithmetic and algebra

A consolidation of basic concepts and skills learnt at primary school is necessary from several points of view. For one thing, ensuring numeracy in all children is an important aspect of universalization of elementary education. Secondly, moving from number sense to number patterns, seeing relationships between numbers, and looking for patterns in the relationships bring useful life skills to children. Ideas of prime numbers, odd and even numbers, tests of divisibility etc. offer scope for such exploration.

Algebraic notation, introduced at this stage, is best seen as a compact language, a means of succinct expression. Use of variables, setting up and solving linear equations, identities and factoring are means by which students gain fluency in using the new language.

The use of arithmetic and algebra in solving real problems of importance to daily life can be emphasized. However, engaging children's interest and offering a sense of success in solving such problems is essential.

Shape, Space and Measures

A variety of regular shapes are introduced to students at this stage: triangles, circles, quadrilaterals, They offer a rich new mathematical experience in at least four ways. Children start looking for such shapes in nature, all around them, and thereby discover many symmetries and acquire a sense of aesthetics. Secondly, they learn how many seemingly irregular shapes can be approximated by regular ones, which becomes an important technique in science. Thirdly, they start comprehending the idea of *space*: for instance, that a circle is a path or boundary which separates the space inside the circle from that outside it. Fourthly, they start associating numbers with shapes, like area, perimeter etc, and this technique of *quantization*, or arithmetization, is of great importance. This also suggests that mensuration is best when integrated with geometry.

An informal introduction to geometry is possible using a range of activities like paper folding and dissection, and exploring ideas of symmetry and transformation. Observing geometrical properties and inferring geometrical truth is the main objective here. Formal proofs can wait for a later stage.

Visual learning

Data handling, representation and visualization are important mathematical skills which can be taught at this stage. They can be of immense use as "life skills". Students can learn to appreciate how railway time tables, directories and calendars organize information compactly.

Data handling should be suitably introduced as tools to understand process, represent and interpret day-to-day data. Use of graphical representations of data can be encouraged. Formal techniques for drawing linear graphs can be taught.

Visual Learning fosters understanding, organization, and imagination. Instead of emphasizing only two-column proofs, students should also be given opportunities to justify their own conclusions with less formal, but nonetheless convincing, arguments. Students' spatial reasoning and visualization skills should be enhanced. The study of geometry should make full use of all available technology. A student when given visual scope to learning remembers pictures, diagrams, flowcharts, formulas, and procedures.

Secondary stage

It is at this stage that Mathematics comes to the student as an academic discipline. In a sense, at the elementary stage, mathematics education is (or ought to be) guided more by the logic of children's psychology of learning rather than the logic of mathematics. But at the secondary stage, the student begins to perceive the structure of mathematics. For this, the notions of *argumentation* and **proof** become central to curriculum now.

Mathematical terminology is highly stylised, self-conscious and rigorous. The student begins to feel comfortable and at ease with the characteristics of mathematical communication: carefully defined terms and concepts, the use of symbols to represent them, precisely stated propositions using only terms defined earlier, and proofs justifying propositions. The student appreciates how an edifice is built up, arguments constructed using propositions justified earlier, to prove a theorem, which in turn is used in proving more.

For long, geometry and trigonometry have wisely been regarded as the arena wherein students can learn to appreciate this structure best. In the elementary stage, if students have learnt many shapes and know how to associate quantities and formulas with them, here they start reasoning about these shapes using the defined quantities and formulas.

Algebra, introduced earlier, is developed at some length at this stage. Facility with algebraic manipulation is essential, not only for applications of mathematics, but also internally in mathematics. Proofs in geometry and trigonometry show the usefulness of algebraic machinery. It is important to ensure that students learn to geometrically visualise what they accomplish algebraically.

A substantial part of the secondary mathematics curriculum can be devoted to consolidation. This can be and needs to be done in many ways. Firstly, the student needs to integrate the many techniques of mathematics she has learnt into a problem solving ability. For instance, this implies a need for posing problems to students which involve more than one content area: algebra and trigonometry, geometry and mensuration, and so on. Secondly, mathematics is used in the physical and social sciences, and making the connections explicit can inspire students immensely. Thirdly, mathematical modelling, data analysis and interpretation, taught at this stage, can consolidate a high level of literacy. For instance, consider an environment related project, where the student has to set up a simple linear approximation and model a phenomenon, solve it, visualise the solution, and deduce a property of the modelled system. The consolidated learning from such an activity builds a responsible citizen, who can later intuitively analyse information available in the media and contribute to democratic decision making.

At the secondary stage, a special emphasis on experimentation and exploration may be worthwhile. *Mathematics laboratories* are a recent phenomenon, which hopefully will expand considerably in future[22]. Activities in practical mathematics help students immensely in visualisation. Indeed, Singh, Avtar and Singh offer excellent suggestions for activities at all stages. Periodic systematic evaluation of the impact of such laboratories and activities[23] will help in planning strategies for scaling up these attempts.

Higher secondary stage

Principally, the higher secondary stage is the launching pad from which the student is guided towards career choices, whether they imply university education or otherwise.

By this time, the student's interests and aptitude have been largely determined, and mathematics education in these two years can help in sharpening her abilities.

The most difficult curricular choice to be made at this stage relates to that between **breadth and depth**. A case can be made for a broadbased curriculum that offers exposure to a variety of subjects; equally well, we can argue for limiting the number of topics to a few and developing competence in the selected areas. While there are no formulaic answers to this question, we point to the Thurston remark quoted above once again.

Indeed, Thurston is in favour of breadth even as an alternative to remedial material which merely goes over the same material once more, handicapping enthusiasm and spontaneity.

Instead, there should be more courses available ... which exploit some of the breadth of mathematics, to permit starting near the ground level, without a lot of repetition of topics that students have already heard.

When we choose breadth, we not only need to decide which themes to develop, but also how far we want to go in developing those themes. In this regard, we suggest that the decision be dictated by *mathematical considerations*. For instance, introducing projective geometry can be more important for mathematics as a discipline than projectile motion (which can be well studied in physics). Similarly, the length of treatment should be dictated by whether *mathematical objectives* are met. For instance, if the objective of introducing complex numbers is to show that the enriched system allows for solutions to all polynomial equations, the theme should be developed until the student can at least get an idea of how this is possible. If there is no space for such a treatment, it is best that the theme not be introduced; showing operations on complex numbers and representations without any understanding of why such a study is relevant is unhelpful.

Currently, mathematics curriculum at the higher secondary stage tends to be dominated by differential and integral calculus, making for more than half the content in Class XII. Since Board examinations are conducted on Class XII syllabus, this subject acquires tremendous importance among students and teachers. Given the nature of Board examinations as well as other entrance examinations, the manipulative and computational aspects of calculus tend to dominate mathematics at this stage. This is a great pity, since many interesting topics (sets, relations, logic, sequences and series, linear inequalities, combinatorics) introduced to students in Class XI can give them good mathematical insight but these are typically given short shrift. Curriculum designers should address this problem while considering the distribution of content between Classes XI and XII.

In many parts of the world, the desirability of having electives at this stage, offering different aspects of mathematics, has been acknowledged. However, implementation of a system of electives is dauntingly difficult, given the need for a variety of textbooks and more teachers, as well as the centralized nature of examinations. Yet, experimenting with ideas that offer a range of options to students will be worthwhile.

Mathematics and mathematicians

At all stages of the curriculum, an element of humanizing the curriculum is essential. The development of mathematics has many interesting stories to be told, and every student's daily life includes many experiences relevant to mathematics. Bringing these stories and accounts into the curriculum is essential for children to see mathematics in perspective. Lives of mathematicians and stories of mathematical insights are not only endearing, they can also be inspiring.

A specific case can be made for highlighting the contribution made by Indian mathematicians. An appreciation of such contributions will help students see the place of mathematics in our culture. Mathematics has been an important part of Indian history and culture, and students can be greatly inspired by understanding the seminal contributions made by Indian mathematicians in early periods of history.

Similarly, contributions by *women mathematicians* from all over the world are worth highlighting. This is important, mainly to break the prevalent myth that mathematics has been an essentially male domain, and also to invite more girls to the mathematical enterprise.

CONCLUSION

In a sense, all these are steps advocated by every mathematics educator over decades. The difference here is in emphasis, in achieving these actions by way of curricular choices.

Perhaps the most compelling reason for the vision of mathematics education we have articulated is that our children will be better served by higher expectations, by curricula which go far beyond basic skills and include a variety of mathematical models, and by pedagogy which devotes a greater percentage of instructional time to problem solving and active learning. Many students respond to the current curriculum with boredom and discouragement, develop the perception that success in mathematics depends on some innate ability which they simply do not have, and feel that, in any case, mathematics will never be useful in their lives. Learning environments like the one described in the vision will help students to enjoy and appreciate the value of mathematics, to develop the tools they need for varied educational and career options, and to function effectively as citizens.

Our vision of excellent mathematical education is based on the twin premises that **all students can learn mathematics and that all students need to learn mathematics.** Curricula that assume student failure are bound to fail; we need to develop curricula that assume student success. We are at a historic juncture when we wish to guarantee education for all. It is therefore a historic imperative to offer our children the very highest quality of mathematics education possible.

REFERENCES

1. Wheeler, David, "Mathematization Matters," For the Learning of Mathematics, 3,1: 45 - 47, 1982.
2. Polya, George, "The goals of Mathematical education", in ComMuniCator, the magazine of the California Mathematics Council, 1969.
3. "Principles and Standards for School Mathematics", National Council of Teachers of Mathematics, USA, 2000.
4. "The New Jersey Mathematics standards and curriculum framework", The New Jersey Mathematics Coalition, J.G. Rosenstein (Ed), 1997.
5. Mathematics Academic Content Standards, California State Board of Education, 2004.
6. "Mathematics Syllabi", Curriculum planning and development division, Ministry of Education, Singapore, 2001.
7. "Mathematics Learning Area" statement, Curriculum Corporation, Melbourne, Australia, 2001.
8. Nemetz, T., "Mathematics education in Hungary." In : I. Morris, S.A. Arora: *Moving into the twenty first century*, UNESCO Series: Studies in mathematics education, No.8., 1991, pp. 105-112.
9. Howson, G.A., "National Curricula in Mathematics", The Mathematical Association, University of Southampton, 1991, pp. 115-125.
10. Ferrini-Mundy, J., Burrill, G. and Breaux, G. (Eds), "Mathematics Education Around the World: Bridging Policy and Practice", Report of the 2001 IAS/ Park City Mathematics Institute Seminar, Institute for Advanced Study, Princeton, 2001.
11. Buxton, Laurie. Math Panic. London: Heinemann, 1991.
12. Krutetskii, V.A., *The Psychology of Mathematical Abilities in School Children.* (edited by J. Kilpatrick and I. Wirszup), University of Chicago Press, Chicago, 1976.
13. Ahmedabad Women's Action Group, "An assessment of the school textbooks published by Gujarat State School Textbooks under NPE", IAWS conference, Calcutta, December 1990.
14. Fennemma, E., "Gender and mathematics: What do I know and what do I wish was known?", Fifth annual forum of the National Institute for Science Education, Detroit, May 2000.
15. Weisbeck, L. "Teachers' thoughts about children during mathematics instruction", PhD dissertation, University of Wisconsin, Madison, 1992.
16. Manjrekar, N., "Gender in the mathematics curriculum", Seminar on Mathematics and Science Education in School: Teaching practices, Learning Strategies and Curricular issues, Zakir Husain Centre for Educational Studies, JNU, New Delhi, March 2001.
17. Thurston,William, "Mathematical education", *Notices of the American Mathematical Society*, 37, 844-850, 1990.
18. Sarangapani, Padma, "A way to explore children's understanding of mathematics", *Issues in primary education*, 2(2), 2000.
19. Subramaniam, K., "Elementary Mathematics: A Teaching Learning Perspective", *Economic and Political Weekly, Special issue on the Review of Science Studies*: Perspectives on Mathematics, Vol 37, no. 35, 2003.
20. Nunes, T. and Bryant, P.E., Children Doing Mathematics, Oxford, Blackwell, 1996.
21. Verma, V.S. and Mukherjee, A., "Fractions - towards freedom from fear", National Seminar on Aspects of Teaching and Learning Mathematics, University of Delhi, January 1999.

22. Singh, Hukum, Avtar, Ram and Singh V.P., *A Handbook for Designing Mathematics Laboratory in Schools*, NCERT, 2005.

23. Sarangapani, Padma, and Husain, Shama, "Evaluation of Maths Lab at Samuha-Plan, Deodurg", Report, National Institute of Advanced Studies, Bangalore, April, 2004.

DRAFT

TEACHING OF INDIAN LANGUAGES

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EXECUTIVE SUMMARY

Language is not only a rule-governed system of communication but also a phenomenon that to a great extent structures our thought and defines our social relationships in terms of both power and equality. The speed with which normal children become linguistically proficient in not just one but often several languages by the time they are three years old shows that we are probably born with an innate language faculty. All specific linguistic development is of course socio-culturally mediated and every individual successfully creates a repertoire of multiple registers to negotiate a variety of social encounters. It is indeed a pity that education planners and language policy makers are not able to capitalize on this innate potential of the child. In a country like India, most children arrive in schools with multilingual competence and begin to drop out of the school system because, in addition to several other reasons, the language of the school fails to relate to the languages of their homes and neighborhoods. Most children leave schools with dismal levels of language proficiency in reading comprehension and writing skills, even in their own native languages. In addition to a variety of socio-political reasons that adversely impinge upon our education system in general, some reasons that are primarily responsible for these low levels of proficiency include: lack of any understanding about the nature and structure of language and the processes of language teaching-learning, particularly in multilingual contexts; acute failure on the part of education planners to appreciate the role of language across the curriculum in contributing towards the construction of knowledge; not paying enough attention to the fact that a variety of biases including caste, race and gender get encoded in language; inability to appreciate the fact that language consists of much more than just poems, essays and stories; unwillingness to accept the role of languages of the home and neighbourhood in cognitive growth and failure to notice that cognitively advanced language proficiency tends to get transferred across languages. It is becoming increasingly clear that linguistic diversity is as important for our survival as bio-diversity.

It seems absolutely imperative that we make provisions for education in the mother tongue(s) of the children and train teachers to maximize the utilization of the multilingual situation often obtaining in the classroom as a resource. Recent research has demonstrated the positive correlation between the multilingual language proficiency and academic achievement. It has also shown that multilingualism leads to greater cognitive flexibility and social tolerance. What we need to do is to ensure comprehensible input in anxiety-free situations and make every possible effort to eliminate caste, color, and gender bias. Unless the education planners pay attention to language across the curriculum in all its dimensions the goals of equity, justice and democracy may remain distant dreams. Our recommendations in Chapter-10 should be seen in the above context and the context of our proposals (Appendix III) about languages in the school curriculum.

1. NATURE OF LANGUAGE

1.0 INTRODUCTION

Most people, including teachers, teacher trainers, textbook writers and curriculum designers and educational planners regard language simply as a means of communication. In order to fully appreciate the role of language in education we must begin to develop a holistic perspective on language. We need to examine it in a multi-dimensional space giving due importance to its structural, literary, sociological, cultural, psychological and aesthetic aspects. Formally language is seen as pairing of a lexicon and a set of syntactic rules where it is systematically governed at the level of sounds, words and sentences. This is, of course, true but it gives us only one side of the picture, though universal in nature.

1.1 Language Faculty

It is important to realize that all children learn the basic systems and subsystems of their language, including a substantial part of their sociological correlates (i.e. they acquire not only linguistic but also communicative competence) before they are three years old. It is eminently possible to engage in a meaningful conversation with a three year old on any subject that falls within her cognitive domain.

> **The awareness that there is an innate Language Faculty has two important pedagogical consequences: given adequate exposure, children will acquire new languages with ease; the focus in teaching should be more on meaning than grammar.**

It therefore seems obvious that in addition to the rich and caring exposure that they receive, normal children may be born with an innate language faculty (Chomsky 1957, 1965, 1986, 1988, 1993). In fact, for most linguists working on the acquisition of language, it has remained a great paradox: how is it the case that given so little (limited data in a short span of time), three year old children manage to create linguistic systems of such enormous complexity. The awareness that there is an innate Language Faculty has two important pedagogical consequences: given adequate exposure, children will acquire new languages with ease; the focus in teaching should be more on content than grammar.

1.2 Language as a Rule-governed System

For linguists, who study the structure of language in a scientific way, the grammar of a language is a highly abstract system consisting of several subsystems. At the level of sounds, languages of the world are closely associated with rhythm and music in terms of their intonation patterns and pitch contours. Similarly, consonantal and vocalic sounds in all human languages are systematically organized. Most languages consist of sound segments that range between 25-80 sounds. They tend to prefer words which show an alternation of consonantal (C) and vocalic (V) sounds such as CVCV rather than have clusters of consonantal and vocalic sounds. For example, no Indian language or even English allows more than three consonantal sounds at the beginning of a word, and even when three are allowed the choices are highly restricted. The first consonant can only be 's', the second only 'p', 't' or 'k' and the third only 'y', 'r','l'or 'w' as in Hindi 'stri' or in English 'spring', 'street' , 'squash' , 'screw' etc. At the level of words a set of small word formation strategies which relate one set of words to another set of words both in terms of form and meaning helps speakers to process a huge lexicon, enabling them to continuously enlarge it throughout their lives. For example, Hindi has a word formation rule for making different plurals of masculine words that end in *-aa* e.g. *laRkaa* 'boy'. The three plural forms are *laRke*, *laRkon* and *laRko*, which are the Nominative, Oblique and Vocative plurals of *laRkaa*. You do not have to learn all the plural forms when you learn a new *-aa* ending Hindi masculine noun. At the level of sentences, once again a small set of rules defines the relationship of different constituents in simple and complex sentences enabling speakers to process an infinite number of sentences everyday. Consider the simple English sentence:

She goes to school everyday.

It has five words and the possible combinations could be five factorial (i.e. 120). But perhaps only two or three combinations are allowed. How does a child speaking English know that in information seeking questions, the *wh*-word will always be in the initial position? For example, you say 'where is my pen?', 'what is your name?' etc. In Hindi, the rule is quite different. The question words appear where the answers could potentially appear. Consider the following:

vah ghar jaa rahaa hai (He is going home.)
vah kahaan jaa rahaa hai (Where is he going?)
kahaan 'where' appears exactly where *ghar* 'home' appears.

The level of discourse in society is structured in addition to all the above by a variety of linguistic, sociological, religious, and cultural conventions obtaining in a particular society.

India has a very long and rich tradition of engaging with the complexity of language and the contributions of scholars such as Pânini, Kâtyâyan, Patanjali, Bhartrhari, Tulkappiyar, Candrakirti, Jainendra, Hemchandra Acharya among others is indeed enormous. It is unfortunate that we have been consistently ignoring this branch of Indian knowledge and we do hope that we will be able to establish institutions that would undertake a scientific enquiry into this area and unfold its pedagogical implications for language teaching. What is encapsulated in Pâṅini ["È•I"s *ashtâdhyâyi* is not paralleled by any modern descriptive grammar. In the Indian tradition, language is speech (not writing); cognition (not just communication) and a constructivist system (not just a representational one). According to Bhartrhari, language constructs the reality (it does not name a pre-existing reality) and it is the form knowledge takes; as a process of conceptualization and articulation, it is non-partitive and non-sequential (Kapil Kapoor, personal communication). Such a holistic conception of language may have important pedagogical implications.

1.3 Speech and Writing

The fundamental difference between speech and writing is that written language is consciously monitored and frozen in time; we can return to it whenever we want. Spoken language is far more transient in nature and changes far more rapidly than the written language. One should not, therefore, be surprised to notice discrepancies between the spoken and written languages. There is no intrinsic relationship between language and script; no sacrosanct connection between the English language and the Roman script or between Sanskrit or Hindi language and the Devanagari script. In fact, all the languages of the world, with minor modifications, can be written in one script, just as any single language can be written in all the scripts of the world. Such awareness about the relationship between language and script has important pedagogical implications. Teachers who become aware of this phenomenon often change their attitudes to errors and begin to develop innovative teaching methods.

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1.4 Language, Literature and Aesthetics

There are several functions of language which have been paid lip service by language education planners. Apart from having the quality of unfolding the world, language has many fictional elements. Poetry, prose and drama are potent sources not only of refining our literary sensibility but also of enriching our aesthetic life, enhancing our synaesthetic abilities and enormously improving our linguistic abilities, particularly reading comprehension and written articulation. Literature also includes jokes, irony, fantasy, story, parody and parable which pervade our everyday discourse and in no way constitute an autonomous universe cut off from 'the world's business' (Habermass 1996).

A considered appreciation of the aesthetic aspects of language would inevitably lead to a preference for linguistic vitality and creativity than obsession with purity and correctness. Such processes would ensure space for dialogue and negotiation rather than monologue and aggression.

At Tagore's Santiniketan, it was common practice that students would read a play with Tagore, translate it into Bangla, prepare to stage it, set-up the stage and finally reach the play to the members of the community in all its glory. A language education policy cannot afford to ignore the fictional, narrative, metaphysical or rhetorical elements of language and treat it only as a useful vehicle or tool for achieving some worldly gains (Marx 1844). Human beings not only appreciate beauty but also often systematically codify laws that govern aesthetic dimensions. A considered appreciation of the aesthetic aspects of language would inevitably lead to a preference for linguistic vitality and creativity than obsession with purity and correctness. Such processes would ensure space for dialogue and negotiation rather than monologue and aggression. This would also hopefully lead to a respect for minor and endangered languages that is legitimately due to them. No community wishes to let its 'voice' die.

1.5 Language and Society

Even though children appear to be born with an innate language faculty, individual languages are acquired in specific socio-cultural and political contexts. Every child learns what to say, to whom and where. Languages are inherently variable, and different styles tend to be used in different contexts by different age groups (Labov 1966, 1972; Trudgill 1974, Gumperz and Hymes 1972, Gumperz 1974). The variability in human linguistic behavior is not thus randomly distributed but links systems of language, communication, thought and knowledge. As Aurorin (1977) points out 'language cannot exist and develop outside society. Development of language is ultimately stimulated by our cultural heritage and the needs of social development, but we would not overlook the reverse dependence either. Human society cannot do without language as the most important, most perfect and universal means of communication, formation of thought and accumulation and transmission of expression.' It is equally important to realize that languages are not 'discrete objects out there', almost frozen in time and space, both physical and mental. They are actually constantly changing, fluid systems of behavior which human beings acquire and change to define themselves and the world around them. Very often languages are treated as entities and people form strong stereotypes about them. We need to be aware of both these aspects of language.

1.6 Language, Attitudes and Motivation

Attitudes and Motivation of learners often play an important role in all language learning. Similarly, the attitudes of the teacher and parental encouragement may contribute to successful language learning. Researchers working in the area of second/foreign language learning have identified several social psychological variables that influence the learning of a second language. Some of these variables are: (1) aptitudes (2) intelligence (3) attitudes (4) motivation and motivational intensity (5) authoritarianism and (6) ethnocentrism. But the most significant variables out of these are the attitudes and motivation, teacher attitude and parental encouragement of the second language learner.

Gardner and Lambert (1972) believe that a learner's motivation for learning a second/foreign language will depend on his attitudes and willingness to identify with the linguistic and nonlinguistic features that generally typify the speakers of the target language. According to them, a motivational orientation is said to be integrative if a person learns a second/foreign language in order to enter into an active interaction with the target language speakers. The motivation is called instrumental if the learner learns the target language in order to get a job or achieve some other utilitarian objective. Gardner and Lambert conclude that success in second/foreign language would be less if the underlying motivation is instrumental rather than integrative.

> **........the variance in second language proficiency is explained not only by motivational and attitudinal variables but also by a variety of social, cultural and demographic variables including claimed control over different languages, patterns of language use, exposure to English, use of English in the family, the type of school, size of the community, anxiety levels, etc.**

In the Indian context, the access to the target language community may be highly variable. For example, in the case of English, even though the native target language community is absent, the amount of exposure available in urban settings may often be substantial. On the other hand, in many rural and tribal areas, English must be treated as a foreign language. In the case of Indian languages, native target language groups may often be far more accessible. A lot of research in the social psychological aspects of second/foreign language was carried out in several parts of the world. Most of these researchers found out that proficiency in second/foreign language was significantly related to attitudes and motivation of the learner. However, there was very little support for Gardner and Lambert's hypothesis that integrative motivation was more significant than instrumental motivation. Several researchers (including Khanna and Agnihotri 1982, 1984) have shown that the theoretical claims of Gardner and Lambert lacked generality as the variance in second language proficiency is explained not only by motivational and attitudinal variables but also by a variety of social, cultural and demographic variables including claimed control over different languages, patterns of language use, exposure to English, use of English in the family, the type of school, size of the community, anxiety levels, etc.

1.7 Language and Identity

It should be obvious that attitudes and motivation do not get constructed in a vacuum. An individual creates the patterns of her behavior in terms of the group(s) she wishes to identify with, acquiring in the process communicative competence that equips her to move along a continuum varying from formal to informal language (Le Page and Tabouret-Keller 1985; Labov 1966, 1971). More often than not we find identities to be in conflict with one another. The question of identity becomes particularly relevant in the case of minorities and there is a great need to be sensitive to their languages and cultures in the interest of national and global peace and harmony. Several studies (e.g. Fishman 1966, 1978; Das Gupta 1970; Brass 1974; Gal 1979; Whiteley 1971; Dorian 1981; Agnihotri 1979; Mukherjee 1981; Cooper 1989; Verma 1998 among others) have shown how the issues centered around minority status interact with patterns of language maintenance and shift. If we discuss the identity question in the context of language education (since languages have been the bearer of the burden of identity politics), it would be more appropriate 'to speak of Identification, a never-ending, always incomplete, unfinished and open-ended activity in which we all, by necessity, or by choice are engaged' (Bauman 2001).

If language facilitates identification rather than mere discovery of some existing identity, it turns out to be something more than a marker of identity, maintenance and a repository of memories and symbols. It could be a springboard which could launch you into the as yet unfathomed depth of multiple possibilities.

If language facilitates identification rather than mere discovery of some existing identity, it turns out to be something more than a marker of identity, maintenance and a repository of memories and symbols. It could be a springboard which could launch you into the as yet unfathomed depth of multiple possibilities.

1.8 Language and Power

In spite of the fact that all languages as abstract systems or subsystems are equal, the complex ways in which history, economics, sociology, and politics interact with language, some languages become more prestigious than others and become associated with socio-political power. It is generally the language used by the elite that acquires power in society and become the standard language. All the grammars, dictionaries and various reference materials will invariably address this 'standard' language. From the point of view of science of language there is no difference between what is variously called standard language, pure language, dialect, variety, etc. A language is often defined as a dialect with an army and navy. More than anything else it is the socio-political and the economic considerations that make people decide the national, official, associate official languages to be used in education, administration, judiciary, mass media, etc. In principle, it is eminently possible to do anything in any language, including advanced research in humanities, social sciences and sciences. It should thus become obvious that languages of the underprivileged will never get empowered unless we provide support structures that would ensure their use in a variety of contexts. It is also important to remember that 'standard' is never a fixed constant. Within the domains of power it keeps changing its locus: non-Brahmin Tamil replaces Brahmin Tamil and Pune Marathi makes way for Bombay Marathi.

If we focus our attention on phenomenon such as the 'Sufi' poetry, 1857 revolt, struggle for freedom, formation of new States within India or Dalit literature, languages of the masses may also often constitute potent sites for dissenting voices. In fact, with some notable expectations such as Aurorin (1977), Lee (1992), Kress (1977), Fairclough (1992) and Hodge (1979) among others, the site of the association of language with social power and exploitation on the one hand and socio-political dissent and democracy on the other has remained largely unexplored.

1.9 Language and Gender

The issue of gender concerns not half but the whole of humanity. Over a period of time, language has coded in its texture a large number of elements that perpetuate gender stereotypes. Several studies (Cameron 1985, 1995; Lakoff 1975, 1990; Tannen 1990; Butler 1990 among others) have addressed the issues centered around language and gender. It is not just that many scholars, including some distinguished linguists, have described female speech as 'trivial' and 'a string of pearls' signifying nothing, but a substantial part of the lexicon and syntactic expressions encode gender-bias. Detailed analysis of male-female conversation has also revealed how men use a variety of conversational strategies to assert their point of view.

It is extremely important that textbook writers and teachers begin to appreciate that the passive and deferential roles generally assigned to women are socio-culturally constructed and need to be destroyed as quickly as possible.

The received notions of what it means to be 'masculine' or 'feminine' are constantly reconstructed in our behavior and are, sometimes unwittingly perhaps, transmitted through our textbooks. In fact, the damage done by the 'gender construction of knowledge' is becoming increasingly obvious. Language, including illustrations and other visual aids, plays a central role in the formation of such knowledge and we need to pay immediate attention to this aspect of language. It is extremely important that textbook writers and teachers begin to appreciate that the passive and deferential roles generally assigned to women are socio-culturally constructed and need to be destroyed as quickly as possible. Voices of women in all their glory need to find a prominent place in our textbooks and teaching strategies.

1.10 Language, Culture and Thought

The relationship between language, culture and thought has been an area of serious enquiry for sociologists, anthropologists and linguists for a very long time. There is no doubt that in addition to a variety of gestures, rituals and paralinguistic features language remains the main source of cultural transmission and cognitive structures. The linguistic and cultural patterns of social behaviour are largely subconsciously acquired and they gradually become constitutive of our identities. The role of multiplicity of languages and diversity of cultures in this context can hardly be emphasized.

If language, on the one hand, structures our thought processes, it liberates us and takes us into unexplored territories of knowledge and imagination.

The relationship between language and thought is indeed very complex and has remained one of the most challenging puzzles for linguists, psychologists and for cognitive scientists in general. According to the strong version of the Sapir-Whorf Hypothesis, our thought is entirely constructed by our linguistic system: 'the background linguistic system of each language...is itself the shaper of ideas, the programme and guide for the individual's mental activity' (Whorf quoted in Carroll 1956: 212-214). The cognitive, social and cultural patterns that govern our perception of the world are largely shaped, formulated and even dictated by the structures of the languages we speak. Whether we believe in the Sapir-Whorf Hypothesis or not, language and thought feed on each other. If language, on the one hand, structures our thought processes, it liberates us and takes us into unexplored territories of knowledge and imagination. In the case of Indian languages and cultures, we, in general, share a linguistic, sociolinguistic and cultural matrix, and an articulation of this matrix in different languages may eventually lead to an enrichment of both linguistic and cultural systems. English in India is also becoming a part of this matrix, though marginally at the moment, but with a clear indication of becoming an inevitable part of the overall Indian linguistic and cultural repertoire.

1.11 Education, Language and Responsible Citizenship

According to UNESCO, 'quality must be seen in light of how societies define the purpose of education'. The purpose of education is to ensure that all pupils acquire the knowledge, skills and values necessary for the exercise of responsible citizenship, to ensure the cognitive development of learners, nurture 'the creative and emotional growth of learners, oppose discrimination against any particular group in any manner or, in other words, lead towards an equitable society' (UNESCO 2004). In the contemporary war-ridden world, the role of responsible citizenship can hardly be overemphasized.

Responsibility implies a developed or evolved faculty of understanding because 'the action oriented towards reaching understanding is the fundamental type of social action' (Habermass1998). It is no longer a question of knowing the world in order to master it. It is now a question of knowing the principles which govern its working to enable oneself, individually and collectively, to live in harmony with others who would be 'different in many aspects and not view it as a comparison but a joyful experience'. School education has been treated all over as a critical site where one can learn to find ways to 'delight in differences' (Human Development Report, UNDP 2004). The question of defining the 'universal competencies that are involved when social actions interact with the aim of achieving mutual understanding' has kept scholars, philosophers and policy makers busy. Habermass says that communicative competence is crucial to achieve mutual understanding. Communication is a major function of languages as they contain 'the possibility of universal understanding within the shell of the most individual expression' (Habermass 2000). In fact, if the future language text books, teacher training and classroom transaction could be conceptualized in the multidimensional linguistic space proposed in this document, languages will go a long way not only in making them educated but also responsible citizens.

2. LANGUAGE LEARNING

2.0 INTRODUCTION

As already pointed out, it remains a mystery how children manage to acquire complex linguistic systems at an extremely young age. Many children become fluent users of not just one but two or three languages by the time they are three or four years old. Not only this, they also know the language they should use in a given context i.e. they acquire the capacity of keeping their linguistic systems separate and of course mix them in legitimate ways when they wish to. For behaviourists such as Pavlov and Skinner, language learning was simply a matter of stimulus-response association acquired largely through pattern practice, mimicry and memorization. It was Chomsky's (1959) '*Review of Skinner's Verbal Behavior*' which shook the foundations of behaviorism. Chomsky argued that unless we posit an innate language faculty, it would become difficult to explain the acquisition of complex linguistic systems. Psychologists such as Piaget and Vygotsky argued for positions that would fall between these two extreme positions. For behaviorists, the mind was a blank slate; for cognitivists such as Chomsky, language was already there in the human mind, hard-wired in the form of a Universal Grammar; for Piaget, language is constructed through an interaction with the environment like any other cognitive system.

It is perhaps unfortunate that educationists and language professionals have not been able to exploit the full potential of Chomsky's proposals. His suggestion that the process of language acquisition must inevitably involve processes of scientific inquiry such as observation of data, classification and categorization, hypothesis formation and its falsification may have important pedagogical implications.

On the other hand, Vygotsky believed that a child's speech is essentially a result of an interaction with society; in the course of her language development a child uses two kinds of speech: egocentric and social, one addressed to herself and the other addressed to the rest of the world. It is important to underline the fact that Piaget and Vygotsky actually worked with children and observed, documented and analyzed their cognitive development. For example, Vygotsky noticed that small children not only develop their own socially mediated speech systems but also a fairly complex pre-writing system. Over a period of time, they need to develop a complex verbal repertoire to interact with a multilingual world.

2.1 The Piagetian Perspective

Although Chomsky's mentalist hypothesis has had enormous influence on the way we look at language acquisition, it is Piaget who has had the most powerful influence in the field of education. The insight that all children pass through pre-operational, concrete operational and formal operational stages of cognitive growth has conditioned the whole pedagogical discourse in a significant way. It is perhaps unfortunate that educationists and language professionals have not been able to exploit the full potential of Chomsky's proposals. His suggestion that the process of language acquisition must inevitably involve processes of scientific inquiry such as observation of data, classification and categorization, hypothesis formation and its falsification may have important pedagogical implications. Piaget dose not accept the innate language faculty hypothesis. According to his constructivist approach, all knowledge systems are created through sensori-motor mechanisms in the process of which a child creates a variety of schematas through the processes of assimilation and accommodation.

2.2 Objectives of Language Teaching

Since most children arrive in school with full-blown linguistic systems, the teaching of languages must have very specific objectives in the school curriculum. One of the major objectives of language teaching is to equip learners with the ability to become literate and read and write with understanding. Our effort is to sustain and enhance the degree of bilingualism and metalinguistic awareness that children have. We would also like to equip learners with such politeness strategies and powers of persuasion that they are able to negotiate all communicative encounters with tolerance and dignity.

Although the interaction of linguistic theory and applied linguistics has produced a variety of teaching methods and materials, the language teaching classroom has remained one of the most boring and unchallenging sites of education, dominated largely by the behaviourist paradigms. In the case of languages children already know we rarely see any progress; in the case of a second language such as English, most children hardly acquire even the basic proficiency levels after 6-10 years of exposure and in the case of classical or foreign languages the total programme consists of memorization of some select texts and noun and verb paradigms. There is no dearth of empirical studies that support these observations. It is imperative that we analyze and understand our specific contexts, identify specific objectives and develop suitable methods and materials accordingly.

Our effort is to sustain and enhance the degree of bilingualism and metalinguistic awareness that children have. We would also like to equip learners with such politeness strategies and powers of persuasion that they are able to negotiate all communicative encounters with tolerance and dignity.

For a very long time now, we have been talking in terms of LSRW skills as the objectives of languages teaching (in more recent times we have started talking about communicative skills, accent neutralization and voice training, etc. in an equally disastrous way). This exclusive focus on discrete skills has had fairly adverse consequences. In this paper, though we, to some extent, continue to describe the objectives in a similar paradigm, we will plead for a more holistic perspective on language proficiency. After all, when we are *Speaking*, we are also simultaneously *Listening* and when we are *Writing*, we are also *Reading* in a variety of ways. And then there are many situations (e.g. friends reading a play together and taking notes for its production) in which all the skills in conjunction with a variety of other cognitive abilities are used together. Some of our objectives would include:

a. **The competence to understand what she hears**: A learner must be able to employ various non-verbal clues coming from the speaker for understanding what has been said. She should also be skilled at listening and understanding in a non-linear fashion by making connections and drawing inferences.

b. **Ability to read with comprehension, and not merely decode**: She should develop the habit of reading in a non-linear manner using various syntactic, semantic and graphophonemic cues. She must be able to construct meaning by drawing inferences and relating the text with her previous knowledge. She must also develop the confidence of reading the text with a critical eye and posing questions while reading.

c. **Effortless expression**: She should be able to employ her communicative skills in a variety of situations. Her repertoire must have a range of styles to choose from .She must be able to engage in a discussion in a logical, analytical and creative manner.

d. **Coherent writing**: Writing is not a mechanical skill; it involves a rich control on grammar, vocabulary, content, punctuation as well as abilities to organize thoughts coherently often using a variety of cohesive devices such as linkers and lexical repetitions through synonymy, etc. A learner should develop the confidence to express her thoughts effortlessly and in an organized manner. The student must be encouraged and trained to choose her own topic, organize her ideas and write with a sense of audience. This is possible only if her writings are seen as a process and not as a product. She should be able to use writing for a variety of purposes and in a variety of situations ranging from informal to very formal.-

e. **Control over different registers**: Language is never used in a uniform fashion. It has innumerable varieties, shades and colours which surface in different domains and in different situations. These variations, known as *registers*, should form a part of a student's repertoire. Besides the register of school subjects, a student must be able to understand and use the variety of language being used in other domains such as music, sports, films, gardening, construction work, cookery, etc.

f. **Scientific study of language**: In a language class, the teaching approaches adopted and the tasks undertaken should be such that they lead a child to go through the whole scientific process of collecting data, observing the data, classifying it according to its similarities and differences, making hypothesis, etc. Thus, linguistic tools can and must play a significant role in developing a child's cognitive abilities. This would be much better than teaching normative rules of grammar. Moreover, this approach is particularly effective in multilingual classrooms.

g. **Creativity**: In a language classroom, a student should get ample space to develop her imagination and creativity. Classroom ethos and teacher-student relationship build confidence in the latter to use her creativity in text transaction and activities uninhibitedly.

h. **Sensitivity**: Language classrooms can be an excellent reference point for familiarizing students with our rich culture, heritage and aspects of our contemporary life. Language classroom and texts have a lot of scope to make students sensitive towards surroundings, people and the nation.

2.3 Some Pedagogical Proposals

Contemporary research on language acquisition has put the learner at the center of language learning. It suggests that a learner will be able to effortlessly construct the grammar of a language if she is provided with comprehensible input in anxiety-free situations. As Krashen (1985) has suggested, input is likely to become intake only if the affective filter is low, i.e. the attitudes are positive and motivation is strong. There is no doubt that in some cases where even English becomes a foreign language it may help to some extent to invoke the conscious reflection of the learner on grammatical values. Krashen has shown how children tend to improve their own output when they are given sufficient freedom and time to edit what they have written. The emphasis on relatively ordered stages of cognitive growth has encouraged language teachers to look at errors as stages in the process of learning rather than as pathologies to be eradicated.

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situations. As Krashen (1985) has suggested, input is likely to become intake only if the affective filter is low, i.e. the attitudes are positive and motivation is strong.

Piaget's emphasis on the interaction with the environment has highlighted the significance of teaching language in rich contexts. Vygotsky's notion of zone of proximal development has further led to child-centric approaches to language teaching. It has now become increasingly clear that every possible effort should be made to bring the classroom setting, howsoever formal, as close to natural language learning situations as possible. Eklavya's *Prashika* (1964) experiment was based on optimal focus on meaning than on form and the *khushi-khushi* books it produced remain a landmark in the history of Hindi language teaching.

'*Prashika* is easily one of the most exciting adventures in children's education in our times. It brought together a set of remarkable individuals whose interests and background varied... The ideas they pursued are recognized the world over as the basic ingredients of progressive pedagogy, such as acceptance of individual uniqueness, small-group activities, and relevance of out-of-school experiences in classroom work.' Krishna Kumar

3. THE CONSTITUTIONAL PROVISIONS AND THE THREE-LANGUAGE FORMULA

3.0. INTRODUCTION

In this chapter we discuss the language provisions made in the constitution of India and the three- language formula. We feel that a considerable amount of intra and inter-state flexibility should be allowed in the implementation of the three-language formula.

3.1 The Constitutional Provisions

Articles 343-351 of part XVII and the 8th schedule of the constitution of India deal with issues of languages of the country. According to Article 343 (1), 'The official language of the Union shall be Hindi in Devanagari script; several special directives are given for the promotion of Hindi: "to promote the spread of Hindi language, to develop it so that it may serve as the medium of expression for all the elements of the composite culture of India". (Article 351)

It is important to point out that Hindi is our official language and not the national language. According to article 343(2), the constitution provides for the use of English for all official purposes for a period of fifteen years. However, by 1965, widespread riots in South India and the fears of domination of Hindi and Aryanization made it clear that English should not be completely demoted from its official status. It was given the status of the Associate Official language in 1965. The constitution also provides that English will be the language of High Court, Supreme Court and Acts of Parliament, etc. The constitution also provides for the rights of its citizens to make representation in any language to the state. Article 350 A (7th amendment Act 1956) provides for adequate facilities for instruction in the mother tongue at the primary stage of education to children belonging to linguistic minorities. We would also like to point out that the 8th schedule of the Indian constitution simply has the title *Languages*. The fact that its richness has grown from 14 to 22 in about fifty years bears evidence to its open nature. It appears that any language spoken in this country could legitimately be a part of the 8th schedule.

> **Hindi is our official and not the national language..... The constitution also provides for the rights of its citizens to make representation in any language to the state. It also provides for instruction in the mother tongue at the primary stage of education to children belonging to linguistic minorities**

The multiplicity of languages in the country and the continued presence of English for a variety of important functions made it clear that no straightforward simplistic solution could sustain the participatory nature of democracy in a plurilingual society. The continued dissociation of English from the colonial rule has gone a long way in diluting negative feelings towards the English language. Its importance as a language of vital opportunities and international contact has become increasingly clear. On the other hand, the number of minority and tribal languages that are claiming their share in the country's educational and power structure is increasingly multiplying. Nor could anyone deny the significance of Hindi developing as a national link language.

3.2 Three-Language Formula

It is therefore not surprising that the three- language formula evolved as a consensus in 1961 in a meeting of the Chief Ministers of different States. The three language formula was modified by the Kothari Commission (1964-1966) seeking to accommodate, as Sridhar (1989: 22) says, interests of group identity (mother tongues and regional languages), national pride and unity (Hindi) and administrative efficiency and technological progress (English). As Pattanayak (1986) points out, the three language formula is only a strategy and not a national language policy. A national language policy will have to take into account a variety of issues and domains that are not covered either by the constitution or the three language formula. The complexity of the language in education even in schools may be seen in some of the charts provided in the Appendix III. They underscore the diversity of linguistic situations in the Indian states.

It is the complexity of this situation that the 1968 three language formula tried to capture; it has been reiterated in the NPE in 1986 and we see its revised version in 1992. The NPE states:

> '8.7 The Education Policy of 1968 had examined the question of the development of languages in great detail; its essential provisions can hardly be improved upon and are as relevant today as before. The implementation of this part of the 1968 Policy has, however, been uneven. The Policy will be implemented more energetically and purposefully.'

Such a statement avoids several complex issues and assumes that nothing has happened in the field of languages since 1960. The 1968 policy states:

> 'Three-Language formula: At the secondary stage, the State Governments should adopt, and vigorously implement, the three-

> language formula which includes the study of a modern Indian language, preferably one of the southern languages, apart from Hindi and English in the non-Hindi-speaking States. Suitable courses in Hindi and/or English should also be available in Universities and Colleges with a view to improving the proficiency of students in these languages up to the prescribed university standards.'

The Three-Language formula is not a goal or a limiting factor in language acquisition, but a convenient launching pad for the exploration of the expanding horizon of knowledge and emotional integration of the country.

The spirit of the three-Language formula thus provides Hindi, English and Indian languages preferably a South Indian language for the Hindi States and regional language, Hindi and English for the non-Hindi speaking states. But it has been observed more in its violation than adherence. The Hindi states operate largely with Hindi, English and Sanskrit whereas the non-Hindi speaking states, particularly Tamil Nadu, operate through a two-language formula, Tamil and English. Still many states such as Orissa, West Bengal, Maharashtra, among others implemented the formula.

3.3 Merits and Demerits of the Three-Language Formula

By adopting the Three-Language formula as a strategy, space was created for the study of proximate languages, classical language and foreign language. Space was also made for the study of the mother tongue. The States were free to adopt languages in education outside the Three-Language formula. Sanskrit could be introduced as a classical language. It could also be adopted as a modern Indian language without violating the spirit of the Three-Language formula. Since 1953, with the declaration of UNESCO that mother tongue is the best medium of child's education, pressure groups worked for the recognition of their languages and their incorporation in the VIIIth Schedule of the Constitution. As long as the basic spirit of the Three-Language formula is maintained, there is no restriction on studying new languages.

Primary education should be bilingual. Successive stages of bilingualism are expected to build up to an integrated multilingualism. The first task of the school is to relate the home language to the school language. Thereafter, one or more languages are to be integrated so that one can move into other languages without losing the first. This would result in the maintenance of all languages complementing one another.

In Appendix III, you will see five 'ideal charts' formulated by participants from different states and one chart proposed by our group. In fact, in many ways, the Focus Group Chart reflects the consensus we arrived at. The six charts show significant similarities: MT must be the medium of instruction at the primary level, English must be taught as a compulsory subject, Hindi must be taught as a compulsory or elective subject and classical and foreign languages must find a place in the school curriculum.

Mother tongue as medium of instruction

The proposed National Focus Group chart in Appendix III has been developed in the context of societal and individual multilingualism obtaining in our country. In this context, we define mother tongue(s) as languages of home, street, neighborhood, peer group and kinship networks; regional language(s) as language(s) widely spoken in the state, or in the case of minorities outside the state; and state language(s) as language(s) officially recognized by each state. We also work all this out against the backdrop of Hindi being our official and link language and English being our associate official and international link language. It is in this context that we suggest that:

a. Mother tongue(s) should be the media of instruction all through the school, but certainly in the primary school. The working Group on the study of Languages constituted by NCERT in 1986 recommends in its report that 'the medium of early education' should be the mother tongue(s) of the learners. In the Indian context, it is all the more necessary because

i) it enables people to participate in national reconstruction;
ii) it frees knowledge from the pressures of the limited elites;
iii) it builds interactive and interdependent societies;
iv) it provides greater opportunity for the advice and consent of greater number of groups and thus is a better defense of democracy;
v) it leads to the decentralization of information and ensures free as opposed to controlled media; and it gives greater access to a greater number of people to education and personal development.

According to UNESCO's Educational Position paper (2003), mother tongue instruction is essential for initial instruction and literacy and should be extended to as late a stage in education as possible. Some studies (e.g. Sahgal 1983) have shown that children who study through mother tongue medium do not suffer any disadvantage, linguistic or scholastic, when they compete with their English medium counterparts. Based on an empirical study of 78 children in the 15-17 age group, Gupta (1995) argued that 'two years of mother tongue medium in the initial stages immensely aids the child's acquiring better linguistic proficiency both in the mother tongue and second language'.

Mother tongue as a medium of instruction can eliminate the linguistic and cultural gap caused by the difference between school language and home language i.e. the reference point might be a minor, minority or major language. Acharya (1984) points out that the reason for 26% of the dropouts at the level of elementary education is the 'lack of interest in education' caused partly by the lack of cultural content in education programmes: language is not only a 'component of culture' but also a 'carrier of culture'. A smooth transition from home language to school language in terms of discourse can be ensured if mother tongue is the medium of instruction.

Education in the mother tongues will facilitate richer classroom transaction, greater participation of learners and yield better learning outcomes. All efforts must be made to provide adequate facilities for this purpose. A positive attitude towards mother tongue education must be ensured from all corners so that learners do not hesitate to opt for the medium they are comfortable with.

However, a regional language may not necessarily be the mother tongue of all the learners in a state, or for that matter in a classroom. Though the Kothari Commission does say that 'children belonging to the linguistic minorities ... have the right under Constitution ... to have ... primary education through their mother tongues', a clear policy regarding minority languages needs to be spelt out.

National Curriculum framework of 1988 and 2000 advocate mother tongue or regional language as the medium of instruction 'at all levels of schooling or at least up to the end of elementary stage' (NCF 2000). However, it does not show sensitivity towards the difference between mother tongue and regional language. This framework suggests that if regional language is not a learner's mother tongue then her first two years of education may happen through mother tongue. Class III onwards 'regional language may be adopted as a medium' (NCF 2000). It is extremely important for educationists and education planners to realize that children may often come to school with full-blown home and neighborhood languages (i.e. Mother Tongues) that may be very different from recognized official, scheduled or regional languages of the neighborhood. As approved by the Education Minister's Conference (1949), children of linguistic minorities have a constitutional right to obtain education their mother tongue(s) if they so desire and if the minimum number of such children is '10 in a class of 40 in a school' (Kothari Commission). Regional language must not come in at this stage. This will facilitate richer classroom transaction, greater participation of learners and yield better learning outcomes. All efforts must be made to provide adequate facilities for this purpose. A positive attitude towards mother tongue education must be ensured from all corners so that learners do not hesitate to opt for the medium they are comfortable with. As Jhingran (2005) points out, over 12% children suffer severe learning disadvantage because they are denied access to primary education through their mother tongues. These children belong to different categories including scheduled tribes, children speaking a languages which carries the stigma of a dialect, children of migrant parents and children speaking languages such as Sindhi, Kashmiri, Dogri and Konkeni, etc. However, utmost care must be taken to produce textbooks, which are not a poor translation of English books, in the languages of these children. This is also the only way in which we may be able to save some of our fast disappearing literacies and local systems of knowledge as well as create a space for the construction of new knowledge in these languages.

xxns, cultures and people that may otherwise be inaccessible.

4. OTHER LANGUAGE ISSUES IN THE SCHOOL CURRICULUM

4.0 INTRODUCTION

We need to locate language education programmes in a multilingual perspective. Multilingualism is a natural phenomenon which relates positively to cognitive flexibility and scholastic achievement. What is critical is that curriculum makers, textbook writers, teachers and parents start appreciating the importance of multilingualism which sensitizes the child to the cultural and linguistic diversity around her and encourages her to use it as a resource for her development.

There is a general consensus among language education planners that bilingualism should be maintained throughout school education. It is, therefore, necessary that the special features and contexts of the languages which fall under the rubric 'other' for a child are kept in mind while devising pedagogy for teaching and learning.

This chapter seeks to draw the attention of curriculum makers, textbook writers, teachers and parents to the social, cultural and historical context of minor, minority, tribal and endangered languages. These languages are repositories of rich cultural traditions and knowledge systems and every effort needs to be made to keep them alive. It can be done only by making provisions for them in the school curriculum framework. Special reference has been made to Urdu since it holds a unique position among Indian languages by not belonging to a well-defined geographical area which has deprived it of the benefits which a language enjoys by being the language of a particular state. This chapter also dwells upon the necessity of learning classical languages with special reference to Sanskrit. Indian education system has been alive to the need of acquiring foreign languages, and this chapter only seeks to underline that.

4.1 Urdu

For linguists, there is no fundamental difference between Urdu and Hindi. Both of them have the same syntax and share a greater part of their phonology, morphology and lexicon. It is only during the last fifty years that efforts have been made to increasingly Sanskritize Hindi and Persionize or Arabicise Urdu with the result that the two varieties on the extreme ends of the continuum often become mutually incomprehensible largely because of differences in the lexicon. On the other hand, the symbolic and sociopolitical significance of these two varieties of Hindustani is indeed immense. The fact that Hindi is written in the Devanagri and Urdu in Perso-Arabic script has become extremely important (though it could easily be done the other way round). It is a pity that along with the increasing unfamiliarity of the modern generation with the Perso-Arabic script, a whole literary and cultural tradition which is an integral part of the Indian ethos is getting lost. Every possible effort should be made to create a social ambience where learners can become bi-scriptal in two 'languages'which are structurally essentially one. We could make a beginning by publishing a large number of biscriptal books of general interest to children and parents and also introducing some lessons in textbooks in both the scripts during classes 3 to 5 (We owe this suggestion to Dr Gyanam Mahajan.).

> **Urdu and Hindi have the same syntax and share a greater part of their phonology, morphology and lexicon....yet for historical reasons, the symbolic and sociopolitical significance of these two varieties of Hindustani is indeed immense...and today we need to recognize their separate status..**

Since all 8th Schedule Languages including Hindi have a minority status outside the states where they are the Principal Languages of the State and since practically every state and district, given the increasing social mobility in the country, is increasingly becoming multilingual there is a clear need for evolving a National Policy on Minority Languages in accordance with the letter and the spirit of the constitution.

Urdu (along with Sindhi) is unique in that while it is spoken all over the country, it is not the language of the majority in any state. But while Urdu demands special attention at the national level, at the state level the problem it faces are the same as those faced by other minority languages and can be resolved only within the framework of a uniform National Policy evolved by all states, which should crystallize into a National Code for Linguistic Minorities.

Evaluation of public policies and monitoring of the state of Urdu, including an assessment of the facilities available for instruction through Urdu and teaching of Urdu from primary to senior secondary level, should be a continuous exercise for the development of a suitable strategy for finding Urdu its due place in the curriculum of secular education.

The educational backwardness of any region or community can only be remedied by maximizing its access to modern education which is, in the Indian context, almost wholly, the responsibility of the state. The State Governments should provide due place and adequate facilities within the educational system to every language that is claimed to be the language of inhabitants of any region of India. In particular, Urdu should be included in the school curriculum at the primary level as the medium of instruction in all government and government-aided schools and in the schools affiliated to the recognized Boards of Education, for those who declare Urdu as their mother tongue.

4.2 Minor, Minority and Tribal Languages

The underprivileged speakers of minor, minority and tribal languages often suffer severe linguistic deprivation also. It is important for us to realize that the major languages of this country, including English, can flourish only in the company of and not at the cost of minor languages. The ideological position that the development of one language also helps in the development of other languages in its ecology leads one to expect that the development of even some of the languages could provide marked impetus to the rest of the languages in the case of the linguistically diverse tribal areas and spur the speech communities to consciously strive in that direction.

This document, therefore, envisions a time when all the languages will have their own orthography and grammars and dictionaries. Even in the absence of standardized varieties, they could become accessible tools for literary endeavor that allows for free expression to develop in all varieties and results in the consolidation of knowledge bases in each language.

> **the development of one language also helps in the development of other languages in its ecology leads one to expect that the development of even some of the languages could provide marked impetus to the rest of the languages**

This endeavor should lead to further the status of these minor, minority and tribal languages by allocation of new communicative role(s) and functions, especially in the domain of education at all levels and mass media and thereby lead to more supportive acquisition planning.

Many languages are becoming endangered and some have actually disappeared from the Indian linguistic scene despite our claims to multilingualism and maintenance. Every time we lose a language, a whole literary and cultural tradition is likely to be erased.

4.3 Classical Language

The social and cultural institutions of contemporary societies are constantly illuminated by the past, and classical languages remain their vehicles. Indian educational system has kept itself open to several classical languages including Tamil, Latin, Arabic and Sanskrit. But the study of Sanskrit deserves far more attention for as Jawaharlal Nehru states 'If I was asked what is the greatest treasure that India possess and what is her finest heritage, I would answer unhesitatingly – It is the Sanskrit language and literature and all that it contains. ... so long as this endures and influences the life of our people, so long the basic genius of India will continue'.

> **Sanskrit has been seen as a language of rituals or one to perform the function of disseminating moral values with the result that the rich aesthetic aspect and variety of Sanskrit literature has often been lost sight of. Recent Sanskrit scholarship has brought to light a rich variety of voices which were lying buried under the expressions of high culture.**

Democratization of the Indian educational system has made it possible for the vast masses of India who had been, for ages, denied access to it, to study and enjoy Sanskrit. The literary, aesthetic and grammatical traditions of Sanskrit have opened up new horizons for the modern world. For example, there is an extremely promising interface unfolding between Panini and Computational Linguistics.

The problem with the study of Sanskrit literature has been that it has been treated as a language of rituals or one to perform the function of disseminating moral values with the result that the rich aesthetic aspect and variety of Sanskrit literature has often been lost sight of. Recent Sanskrit scholarship has brought to light a rich variety of voices which were lying buried under the expressions of high culture. It has helped one to talk about many traditions in Sanskrit language and to contextualize them. This would have serious and far-reaching implications in terms of the pedagogy of teaching-learning Sanskrit. In the case of Sanskrit as an MIL, it has now become possible to convince textbook writers to write not only in classical Sanskrit but also in conversational living Sanskrit, something learners can use in their own life.

4.4 Foreign Language

In the context of this document, the term mother tongue(s) refers to languages that a child learns before coming to school. These would include the languages of her home, neighborhood and peer group. On the other hand, languages that a child learns in school but which are still a part of her larger environment may be termed second languages.

> **Since a foreign language is not at all available in the immediate environment of the learner, it demands completely different pedagogical strategies from those of first or second language teaching. It is possible that the focus on the teaching of grammar increases as one moves from the first to the second and finally to the foreign language.**

But languages which are learnt in tutored settings in classrooms and where the target language community is not accessible to the learner may be called foreign languages. In addition to the mother tongue and other languages of the country that a child learns in school, foreign languages such as German or French have a legitimate place in the school curriculum. Every new language provides a new perspective on the world and enriches the cognitive growth of the learner. As a Czech proverb has it: 'every additional language you learn is another soul added to your being'.

Since a foreign language is not at all available in the immediate environment of the learner, it demands completely different pedagogical strategies from those of first or second language teaching. It is possible that the focus on the teaching of grammar increases as one moves from the first to the second and finally to the foreign language. However, even in the case of a foreign language, it appears that comprehensible texts constitute the most potent tools of language teaching. As is clear from the various charts reproduced in the Appendices, most of them agree that a foreign language should be introduced only at the secondary or senior secondary stages. Since Cognitively Advanced Language Proficiency (CALP) tends to get transferred from one language to another it would seem appropriate that a foreign language is introduced when learners have achieved a certain level of cognitive maturity.

4.5 Teaching other languages

In the case of teaching other languages as subjects and using them as medium of instruction, we need to emphasize that greater the degree of distancing the nature of language from the linguistic variety that the learner's community actually uses, the greater will be the problems that learners are likely to face. This is particularly true in the case of 'Sanskritization' of different languages including Hindi and Urdu. Very often the artificial style that is used in language textbooks makes them almost incomprehensible to an ordinary learner. One of the most effective pedagogical practices in this context is to move from the known to the unknown; unfortunately, we tend to move from the ancient to the modern.

5. MULTILINGUALISM AND SCHOLASTIC ACHIEVEMENT

5.0 INTRODUCTION

Multilingualism is constitutive of the Indian identity. Even the so-called 'monolingual' in a remote village often controls a verbal repertoire that equips her to function adequately over a large number of communicative encounters. In fact, the multiplicity of Indian voices interact with each other in the Indian linguistic and sociolinguistic matrix which is built on a variety of shared linguistic and sociolinguistic features. On the other hand, several recent studies have effectively demonstrated the positive relationship of bilingualism with cognitive growth and scholastic achievement.

5.1 India as a Multilingual Country

The facts about India being a multilingual country are well-known. The 1971 census, which can legitimately be considered most authentic in this respect, recorded a total of 1652 languages belonging to 5 different language families in this country. Over 87 languages are used in the print media, 71 languages are used in the radio and the administration of the country is conducted in 13 different languages. Yet one notices with a sense of regret that only 47 languages are used as media of instructions in schools. One hopes that as a result of this position paper, more and more mother tongues will be used as media of instruction in schools. In spite of this enormous diversity several linguistic and cultural elements bind India in a linguistic and socio-linguistic area. In fact very often genetically unrelated and geographically separated languages share a common grammar of culture articulated through language. Pandit (1969, 1972, 1988), Pattanayak (1981, 1988), Srivastava (1979, 1988), Dua (1985) and Khubchandani (1983, 1988) have worked intensively towards characterizing Indian Multilingualism. Pandit has shown how variability in linguistic behavior facilitates rather than breaks down communication in multilingual societies.

It should be obvious from the discussion of multilingualism that our education system should make every conceivable effort to sustain multilingualism (see Crawhall 1992; Heugh et al 1979 among others) rather than suppress it. Pattanayak (1981) has argued how our educational system has consistently weakened the advantages of grassroot multilingualism that characterizes our society. Before it is too late the education planners in this country should pay immediate attention to the centrality of language in education.

> **...if participatory democracy has to survive we need to give a voice to the language of every child... rather than a strict implementation of the three language formula, it is the survival and maintenance of**

multilingualism which should be at the heart of language planning in this country.

As Illich (1981) points out, we need to make every possible effort to empower the languages of the underprivileged and tribal and endangered languages. Affirmative action is called for in this domain. One can not keep waiting for people to ask for their language rights. According to Illich, we first spend millions of dollars to demote tribal languages and then invest token amounts of money to celebrate them as objects of wonder. As Pattanayak (1981) points out if participatory democracy has to survive we need to give a voice to the language of every child.

The three language formula which has been reinforced by a variety of educational commissions should be seen in this context. It is with a sense of regret we note that the three language formula has rarely been implemented in its true spirit anywhere in the country. We have, therefore, suggested throughout this position paper that rather than a strict implementation of the three language formula, it is the survival and maintenance of multilingualism which should be at the heart of language planning in this country. The national Association of Bilingual Education in the US made it clear that the gains made by bilingual education would include, 'improved academic achievement test scores, reduced rates of school dropout, and student absenteeism from increased community involvement in education, and enhanced student self esteem' (Hakuta 1986).

5.2 Bilingualism and Scholastic Achievement

For a very long time, it was believed that bilingualism has a negative relationship with cognitive growth and scholastic achievement (see e.g. Jesperson 1922; Weisgerber 1933; Saer 1923 among others). For example, Saer (1923) tried to show that 7-14 years Welsh-English speaking bilinguals had lower IQ levels as compared to their monolingual counterparts.

On the other hand, several recent studies (see e.g. Peal and Lambert 1962; Gardner and Lambert 1972; Cummins and Swain 1986, among others) have now convincingly shown that there is a highly positive relationship between bilingualism, cognitive flexibility and scholastic achievement. Bilingual children not only have control over several different languages but are also academically more creative and socially more tolerant. The wide range of linguistic repertoire that they control equips them to negotiate different social situations more efficiently. There is also substantial evidence to show that bilingual children excel in divergent thinking. There is thus every reason to promote bilingualism in the school curricula. We need to recognize here once again that a variety of advanced level linguistic skills easily get transferred from one language to another and the learner does not have to put in any extra effort for this largely unconscious transfer. Cummins (1976, 1981) and Cummins and Swain (1986) have made a very fundamental distinction between Basic Interpersonal Communicative Skills (BICS) and Cognitive Advance Language Proficiency (CALP). The language ability that is associated with BICS largely involves the skills to perform effectively in situations that are rich in context and undemanding at the level of cognition. The language of here and now and that of peer group interaction belongs to the domain of BICS.

Bilingual children not only have control over several different languages but are also academically more creative and socially more tolerant. The wide range of linguistic repertoire that they control equips them to negotiate different social situations more efficiently. There is also substantial evidence to show that bilingual children excel in divergent thinking.

It would appear that BICS level abilities have to be acquired almost afresh in every language, though in multilingual societies such as that of India they do get far more easily acquired through natural acquisition processes. CALP level abilities are needed to perform effectively in contextually poor and cognitively demanding situations. It would generally be acquired in tutored language settings. For example, when a secondary or semi-secondary student is asked to write an essay on a topic he is not familiar with, or read a newspaper editorial to critique it he may have to invoke her CALP level abilities. These abilities as we said often tend to get transferred from one language to another.

5.3 Need to promote Multilingualism

Social harmony in a country as diverse as India is only possible through mutual respect for each others' language and culture. Such respect can only be built on knowledge. Ignorance breeds fear, hatred and intolerance and is the greatest barrier to national identity formulation. With each State having one dominant language, there is bound to develop a certain amount of ethnocentric attitude and loyalty. This not only hampers the free movement of people and ideas but also imposes restriction on creativity, innovation and diffusion and retards modernization of the society. Now that we also know of the positive relationship between multilingualism, cognitive growth and educational achievement, there is every need to promote multilingual education in schools.

6. Methods

6.0 INTRODUCTION

The number of methods that linguistic and learning theories have produced over a period of time irrespective of whether we are talking of first, second or foreign language teaching is indeed very large. Most of these methods have indeed developed in the context of second language acquisition. We are concerned not just with first but also second and third languages and also the teaching of classical and foreign languages, and in a variety of different contexts. These methods range from the traditional Grammar Translation Method, Direct Method, Audio-lingual Approach, Communicative Approach, Computer-aided Language Teaching (CALT), Community Language Learning (CLL), Silent Way, Suggestopedia and Total Physical Response (TPR) and language teaching methods emerging out of such second language acquisition theories as Krashen's Monitor Model and Schumann's Acculturation Model (see e.g. Nagaraj 1996; Littlewood 1981; Brumfit 1980; Brumfit and Johnson 1979; Anthony 1972).

6.1 Limitations and Lessons

Each of the methods mentioned above has its merits and demerits. What we need to underline is that each one is developed in a specific historical context in theory and practice, and in response to specific needs. The Grammar-translation method, for example, was eventually located in behaviorist psychology and structural linguistics as well as the needs of the colonial government. However, it did show us how a literary language would be learnt fairly effectively when the focus is on content and holistic text.

Even if we decide to adapt the Grammar-translation method to our contemporary needs we will not only need to modify it in a variety of ways but will also need to turn to some lessons learnt from the Direct, Audio-lingual and Communicative Approaches to take care of the spoken component of the language being learnt. Methods such as the Silent Way, Suggestopedia and Total Physical Response (TPR) were targeted at very specific needs. Research has shown that the Total Physical response (TPR) method may prove to be highly successful in the initial stages of language learning and by breaking the inhibition of the learner.

6.2 Towards Appropriate Methods

Here we will try to explain in some detail some of the basic principles that should inform our language teaching methods. Needless to say that every teacher will evolve his or her specific method depending on a variety of social psychological, linguistic and classroom variables. The new dispensation must empower the teacher to use his or her space in the classroom more effectively and innovatively. Some of these basic principles among others include:

a. **Learner**: Whatever be the method used in the classroom, the learner should never be treated as an empty receptacle. She should be at the center of the teaching-learning process. The teacher will gradually need to explore the cognitive potential and interests of the learner to adjust her language teaching methodology.
b. **Attitude**: It is only when the teacher will be positively inclined towards all pupils, irrespective of their caste, color, creed or gender that they will tend to get positively motivated to be involved in the teaching-learning process. Teachers' positive attitudes will also go a long way in lowering the anxiety levels of learners which are known to obstruct the learning process.
c. **Input**: Following Krashen (1981, 1982), we suggest that the input should be rich, interesting and challenging and should be woven around topics which encourage peer group learning. Modern technology may help schools in a significant way in this context.

The teacher will gradually need to explore the cognitive potential and interests of the learner to adjust her language teaching methodology.

d. **Multilingualism as a Resource**: As we have argued elsewhere in this paper, language teaching methods can be eminent sites for utilizing the multiplicity of languages available in the classroom. A sensitive analysis of the multilinguality obtaining in the classroom in collaboration with children will help in creating a metalinguistic awareness among the teachers and the taught. Translation may prove to be a very powerful tool in this context.
e. **Issues of Gender and Environment**: It is necessary that modern language teaching methods create awareness about the gender and environment issues among children. It should be possible to address these issues implicitly and effectively through careful and sensitive language teaching methods.
f. **Assessment**: Every possible effort should be made to make assessment a part of the teaching-learning process. Whenever we break the normal classroom processes for a test or examination, we mange to raise the anxiety levels of the learners, disrupting the learning process in a significant way.

7. MATERIALS

7.0 TYPES OF MATERIALS

"'Materials' include anything which can be used to facilitate the learning of a language. They can be linguistic, visual, auditory or kinesthetic, and they can be presented in print, through live performance or display, or on cassette, CD Rom, DVD or the internet. They can be instructional in that they inform learners about the language, they can be experimental in that they provide exposure to the language in use, and they can be elicitative in that they stimulate language use, or they can be exploratory in that they seek discoveries about language use." (Tomlinson 2001: 66).

7.1The Textbook

No course book can be ideal for any particular class. An effective classroom teacher needs to be able to evaluate, adapt and produce materials so as to ensure a match between the learners and the materials they use. Every teacher can be a material developer and therefore should provide additional teaching material over and above course book material.

Some advocates of course books argue that these materials help to achieve consistency and continuation and give learners a target that teachers and learners try to attain at the end of a specific time. However, there are some researchers who believe that course book materials cannot cater for the diverse needs of all its users; it imposes uniformity of syllabus, and it removes initiative and power from teachers (see Allwright 1981; O'Neil 1982; Littlejohn 1992; Hutchinson and Torres 1994). It is a pity that language textbooks which should always be most inviting and challenging, generally end up being boring and unimaginative. In particular, the language textbooks for pre-primary and primary education should be written with great sensitivity and care. They should be contextually rich and provide suitable challenges to the creativity of learners. These books should not consist of just stories and poems but reflect a whole range of genre and themes including tasks that would involve careful observation and analysis and finally an aesthetic synthesis in oral and written articulation. Illustrations, layout and design are an integral part of textbooks. In most cases, textbooks are written first and then handed over to illustrators. This process results in a pathetic mismatch between content and illustration and of course at great cost to the public exchequer. A team of textbook writers, layout professionals and illustrators should work in tandem right from the beginning and a smaller team from this group must be associated with the production of textbooks. What we think is most disastrous is that a master textbook is generally produced in one language and then it is translated into other languages. It is indeed a mockery of the kind of relationship we have been trying to unfold between language, thought and culture.

In spite of all the major technological breakthroughs, we know that textbook will continue to be the major source of knowledge for the ordinary child. It is therefore important to produce it with as much care as possible. During the process of production there should be continuous trialling in collaboration with teachers and children; it should also be possible to develop feedback mechanisms which will help us to improve the books all the time.

7.2 Discrete language Teaching Vs. Communicative Teaching

Most textbooks aim at explicit learning of language and practice. Most textbooks follow an approach which adds communicative activities to a base form-focused instruction. It is believed that learners can gain confidence and a sense of progress from focusing on a systematic series of discrete features of the language. But those textbook writers who have been influenced by theories of researchers such as Krashen (1982; 1988) have produced materials that aim at facilitating informal acquisition of communicative competence through communicative activities such as discussions, projects, games, simulations and drama (see Malay et al 1980; Malay and Moulding 1981; Frank et al 1982; Porter Ladousse 1983; Klippel 1984).

Some researchers advocate a strong focus on language experience through a task-based or text-based approach (see J. Willis 1996) and some advocate experience plus language awareness activities (Tomlinson 1994).

7.3 Nature of Materials: Authentic vs. Contrived

For quite some time now there has been a debate about the nature of materials. Most books that aim at explicit learning make use of examples of language that focus on the linguistic features being taught at a particular point of time. The examples chosen are usually short, easy and not necessarily in everyday use.

> **Those who wish to provide learners meaningful exposure to language choose authentic texts that are typically used in everyday life. These texts may not be produced specifically for language teaching purpose.**

These researchers stress the motivating effect of using authentic materials on learners; (Bacon and Finnemann, 1990; Kuo1993; Little et al 1994). However, Widdowson (1984: 218) says that 'pedagogic presentation of language...... necessarily involves methodological contrivance which isolates features from their natural surroundings'. Day and Bamford (1998: 54-62) attack the 'cult of authenticity' and advocate simplified reading texts which have 'the natural qualities if authenticity'.

7.4 Themes/Topics

While some form of censorship might be desirable, most researchers believe that learners should be exposed to the themes or topics that would stimulate them and facilitate learning. The materials should make learners socially sensitive and respond to issues relating to drugs, gender, AIDS, premarital sex, violence, politics, etc. The materials should gradually shift from local cultures to neighboring cultures and then to the world cultures.

7.5 Evaluation of Materials

No material is fit for all times and for everyone. A set of criteria needs to be identified before any material is evaluated. Recently there have been attempts to help teachers to conduct action research on the material they use (Edge and Richards 1993; Jolly and Bolitho 1998) and to develop instruments for use in conducting pre-use, whilst use and post-use evaluation (Ellis 1998a, 1998b). In fact, what is important is to continuously enrich guidelines for producing new materials. For example, it should become increasingly clear that textbooks should provide space not only for different themes but also for different varieties of language. In the context of India in particular, we feel that language textbooks should attempt to introduce teachers and learners to the richness and diversity of our linguistic and cultural heritage. In addition to including lessons to the languages of different states, it may be very useful to provide a linguistic map of India.

7.6 Who should be the Material Writers?

The material writers may be teachers and teacher trainers who are in touch with the needs and aspirations of the learners. The college and university language teachers, linguists and innovative NGOs should collaborate with these teachers to produce a variety of learning materials. It is not uncommon that materials jointly produced by teachers and learners become learning material for them and for junior classes. In fact, local dictionaries, wall magazines, folk tales and songs, ethnographic narratives, documentaries, etc. are increasingly becoming effective sites of classroom transactions. Our experience shows that most effective materials are produced in workshops in which teachers, teacher trainers and university academics work together and try out their materials in classrooms on a regular basis.

7.7 Developing Integrated Skills

If we look around us in our daily lives we can see that we rarely use skills in isolation but in conjunction with each other.

> **...textbooks should provide space not only for different themes but also for different varieties of language;... materials jointly produced by teachers and learners become learning material for them and for junior classes. In fact, local dictionaries, wall magazines, folk tales and songs, ethnographic narratives, documentaries, etc. are increasingly becoming effective sites of classroom transactions.**

Therefore, one of the jobs of the teacher is to make students 'communicatively competent' in the language being learnt. The course books should focus on situations where in our daily lives we would be performing tasks which involve a natural integration of language skills. As 'integrated skill materials are more likely to involve the learner in authentic and realistic tasks, their motivation level will increase as they perceive a clear rationale behind what they are being asked to do.' (Mc Donough and Shaw 1993: 203-204).

8. TEACHER

8.0 INTRODUCTION

The classroom constitutes an important site where children, teachers and texts of all kinds interact in a variety of complex ways and in this interaction teachers have an extremely important role to play. We are convinced that there is no substitute for professionally trained and socially-sensitive teachers. Both the central and the state governments should invest in carefully-planned ways in a qualitative teacher-training programme which would eventually enable every teacher to become a meaningful researcher in her own right. We should also create systems and structures through which the knowledge that the classroom teacher creates becomes a valuable part of educational knowledge in general (Roberts 1995).

8.1 Teacher's Role in the Classroom

The role of the language teacher to the extent that language cuts across the curriculum and to the extent that language knowledge reinforces social relationships in a variety of complex ways is indeed of special significance. We know, as Bourdieu (1978, 1993) says, 'the teacher remains the holder of a mandate, delegated authority who can not redefine his task without entering into contradictions or putting his receivers into contradictions...' (P, 57). Yet, we are equally strongly aware that the processes of social change must also to some extent start in the classroom (Agnihotri 1995).

8.2 Teacher Training

Teacher training programmes in our country are in a dismal state. The outdated one year B.ED programme hardly equips the teacher to meet the complex challenges of a modern classroom. Substitutes such as *Shikshakarmis* have further demoralized the teaching profession. The situation is worse when one takes into account tribal education. Tribals constitute 8% of the Indian population. Although percentage-wise they appear less, they are probably bigger than the population of Australia. In a state like Orissa, they constitute 24% of the population of the state. In Orissa, there were sixty two tribal groups. Now, only twenty two languages survive, threatened and endangered. The rest of the languages have joined the main stream!

The role of the language teacher to the extent that language cuts across the curriculum and to the extent the use of language reinforces social relationships in a variety of complex ways is indeed of special significance.

Generally the teachers in the tribal schools know neither the languages of their students nor of their parents. In the tribal schools in Orissa, students are warned not to use their home language in the school between 10 a.m. and 4:30 p.m. Similar situations exist in schools in the North East and Delhi!!

Several studies have shown that students in tribal schools cannot read a full sentence in their textbook in the Vth standard. They recognize letters and construct words with difficulty. It is not considered important that teachers should know the languages of learners; that special methodologies may have to evolved to bridge the gaps between the languages of home, neighbourhood and school. More often than not classroom transaction is a one way communication from the teacher to the student with no guarantee of comprehension on the part of the learners. In order to promote multilingualism and encourage the kind of cognitive growth we have been trying to articulate in this paper, it should be obligatory for a teacher to learn the language(s) of her pupils.

One hopes that the teacher training programmes will focus on some basic elements of designing a research study focusing simultaneously on sampling, tools, data elicitation, procedures, analysis and triangulation of quantitative and qualitative data. Special analysis in the case of classrooms should be given to case studies of children. This part of the training will of course cut across all disciplines.

8.3 Need for Intensive Innovative Training

Our classrooms are still dominated by the teacher and textbook centered language teaching methods in which the teacher is regarded as the ultimate repository of knowledge and where learning largely takes place through pattern practice, drilling and memorization. We hope that new teacher training programmes will sensitize the teachers to the nature, structure and functions of language, language acquisition and language change and equip her with strategies that can help her to build on the resources of a multilingual classroom. Work done by a variety of agencies and individuals including STAMP (Scientific Theory and Method Project in the US) particularly in Denis et al (1985) and Sproat (1984), National Language Project (1992), Agnihotri (1992, 1995) show how teachers can participate as researchers as well as facilitators of linguistic and cognitive growth of children in multilingual classrooms.

8.4 Teacher as Researcher

It is important to appreciate the value of teacher research as feed back into textbooks and curriculum design. The real voice of children and their parents is most likely to be heard through the agency of teachers. If we can train our teachers to be sensitive observers at all linguistic levels such as those of sounds, words, sentences and discourse, there is no doubt that we should be able to produce more effective and challenging syllabii, textbooks and teaching aids.

There is no doubt that teachers in general and in countries such as India in particular work under highly disadvantaged conditions. In addition to their normal duties, they are asked to participate actively, often without any additional payment and sometimes at the cost of teaching in schools, in elections, literacy drives, family planning, census, etc.

New teacher training programmes will sensitize the teachers to the nature, structure and functions of language, language acquisition and language change and equip her with strategies that can help her to build on the resources of a multilingual classroom. The real voice of children and their parents is most likely to be heard through the agency of teachers. If we can train our teachers to be sensitive observers at all linguistic levels such as those of sounds, words, sentences and discourse, there is no doubt that we should be able to produce more effective and challenging textbooks and teaching aids.

The school conditions are also in many cases not particularly conductive to teach meaningfully even at a minimal level. Yet, she is the only link we have who can sensitize the children in her class to the rise and fall of tones and changes in pitch contours; the only one who can sensitize them to the rhythm of poetry and the precision of prose. If she is properly trained, she should be able to appreciate that children come to school with an enormous linguistic and cognitive potential. In the case of language, it is particularly true that every normal child is a flawless speaker of her own language. A sensitive teacher would know how best to build bridges between the languages children bring to the school and the languages that are used in schools. She should be able to appreciate that standard languages do not appear as God's word or out of vacuum but are the creation of social forces and that given a certain history and a certain social structure any language could potentially be a standard language. She would be able to see errors as stages, almost invariably as necessary stages, in the processes of learning of language.

9. ASSESSMENT

9.0 INTRODUCTION

Assessment is an integral part of the teaching-learning process. Current final examination- oriented assessment procedures induce very high levels of anxiety. For the past few years, the number of suicide attempts near the terminal class X or XII examination has been multiplying. Several studies (see Horwitz, Horwitz and Cope 1986; Mandler and Sarson 1952; Steinberg and Horwitz 1986; Abdul Hamid 2005) have also shown that high levels of anxiety are negatively associated with performance in examinations. Every possible effort should be made to make assessment procedures increasingly challenging and enjoyable rather than boring and threatening. The amount of research done in the evaluation of various linguistic skills (e.g. reading, writing, speaking, listening), including communicative skills and coherence is enormous (see, for example, Alderson 1979; Bachman 1989; Davies 1969; Oller 1983; Valette 1967; Harris 1969; Spolsky 1978; Harrison 1980; Kintsch 1974, 1988) and we should benefit from them.

As many of these studies suggest, evaluation is a continuous process, and it aims at assessing the learner's acquisition of the structure and form of the target language, her ability to use it in different authentic communicative situations and her potential to appreciate the aesthetic aspects of language. It helps us to know about the progress the learner may have made, and to use this knowledge as a feedback for timely intervention for the benefit of the learner and the teacher.

Evaluation of the learner should be based on the assessment of both linguistic knowledge and communicative skills. The learner should be assessed both in relation to herself and her classmates using a battery of tests and test types, e.g. open or closed type questions, multiple choice questions or free development tasks. Innovative ways of evaluating the learner's progress can be based on group work and projects.

9.1 Types of Tests

Tests refer to any procedure for measuring knowledge, abilities and performance. In language teaching a test must be seen as an extension of class work, providing the learner and the teacher with useful information that can serve as the basis for improvement in her teaching methods and materials.

a. **Aptitude Tests:** An aptitude test measures a learner's aptitude for foreign/second language learning. It helps in identifying those students who are likely to be successful in it.

b. **Criterion-referenced Tests:** A criterion referenced test is designed to measure well-defined and fairly specific objectives. In other words, it is course/program specific. Diagnostic and achievement tests belong to this category. A diagnostic test reports on the learner's progress in learning particular elements of the course. It is normally used at the end of a unit in the course. An achievement test is intended to show the standard which the learner has reached in comparison with other learners at a particular stage of learning. The purpose of the achievement test is to gauge how successful learners have been in attaining the objectives laid down at the beginning of the course.

c. **Norm-referenced Tests:** A norm-referenced test is a test of global language abilities. Most of the placement and proficiency tests are norm-referenced tests. The aim of a proficiency test is to assess the learners' ability to apply in actual situation what they have learned and to find out whether the learner has reached a certain standard in relation to specific abilities.

These tests can be objective or subjective. Objective tests can be scored mechanically. They consist of multiple choice questions, transformations, completion, true/false, matching, etc. Subjective tests require personal judgment on the part of the examiner and are difficult to mark and time consuming. They are not considered fit for examinations that involve very large number of examinees.

9.2 Developing a Test

Developing any test, including a classroom test, goes through three stages: 1) The design, 2) The operation and 3) The administration of the test.

The design stage includes the description, identification and selection of the items to be used. The operation stage involves developing specification for the types of tasks to be included in the test and a blueprint that describes how the test will be organized to form an actual test.

> **Evaluation is a continuous process...its primary objective is to get feedback to improve methods, materials, teacher training and classroom transaction...**

It involves the actual test tasks, writing instruction and specifying the procedures for scoring the test. The administration stage involves giving the test and collecting information and analyzing the scores.

Test development helps the teacher monitor the usefulness of the test. The process of test development is interactive. It helps us to reconsider and revise decisions regarding the test at a later stage. It also helps to develop and define scoring scales/methods.

9.3 Test Tasks

There is a variety of test tasks ranging from *nonproductive test tasks* (e.g. matching, multiple choice, sequencing, etc.), *productive test tasks* (cloze testing, dictation, translation, note taking, composition, etc.) to *portfolio assessment* (a file of students' creativity over a period of time). A language portfolio is an organized collection of documents which individual learners can assemble over a period of time and display in a systematic way. It is considered as an alternative to standardized testing. It allows the learners to assume responsibility for their learning.

Recent trends in language evaluation suggest that it might be useful to have a balanced battery of discrete point and integrative tests. Integrative tests such as the cloze procedure, based on gestalt psychology, are extremely versatile and can be creatively use at all levels in a variety of formats Cohen 1980). Similarly, translation is beginning to be used in a variety of productive ways, particularly in multilingual classrooms.

10. RECOMMENDATIONS

Following from the foregoing discussions, we make the following recommendations:

1. Primary education is essentially language education. Even the elementary arithmetic and early knowledge about society and environment are best acquired through the mother tongue(s) of learners. The medium of instruction at the level of primary school must be the mother tongue(s) of learners building upon the rich experiential, linguistic and cognitive resource they bring to schools. The medium of instruction for the rest of the school education should be the mother tongue(s)/regional language(s) of the learner. But in the case of Kendriya and Navodaya Vidyalayas, where Hindi and English are used from Class I, the practice may be continued. Creation of at least one Hindi-English bilingual college in each state may be pursued to accommodate students from Kendriya Vidyalayas.
2. Where qualified teachers and adequate infrastructural facilities are available, English may be introduced from primary level but for the first couple of years it should largely focus on oral-aural skills, simple lexical items or some day-to-day conversation. Use of the languages of children should not be forbidden in the English class and the teaching should as far as possible be located in a text that would make sense to the child. If trained teachers are not available, English should be introduced at the post primary stage and its quantum increased in such a way that learners should soon reach the levels of their classmates who started learning English early.
3. Every possible effort should be made to build bridges between the languages of home, peer group and neighborhood languages on the one hand and school on the other. Even in English medium schools, mother tongues should be developed to function as media and allow the learners to switch from one medium to the other without change of school.
4. Mother tongue(s)/regional language(s) should continue to be taught till all levels because high levels of proficiency in the mother tongue(s) or language(s) of the neighborhood ensure better cognitive growth, foster healthier inter-personal communication skills and promote conceptual clarity.
5. Every possible effort should be made to sustain a high degree of bilingualism throughout school education since there is a highly positive relationship between bilingualism and scholastic achievement too. Unless we ensure high levels of proficiency in language(s), levels in achievements in Mathematics, Social Sciences and Sciences may not improve.
6. All possible efforts should be made by curriculum designers, textbook writers and teacher trainers *to build networks across different subjects and languages* in order to enhance levels of language proficiency. Since advanced levels of language proficiency skills tend to get automatically transferred from one language to another, it is eminently desirable to focus attention **on languages across the curriculum**. The expected levels of language proficiency in different subjects should be in consonance with the levels of languages as subjects.
7. Sanskrit may continue to be taught as a Modern Indian Language from Class-VI, but as a classical language Sanskrit, Classical Tamil (which is distinct from the

contemporary spoken standard) or Latin should be taught in an interesting and challenging way for at least two years at the secondary or senior secondary level.

8. As far as possible, efforts should be made to teach a foreign language for two years at the senior secondary level.
9. Input in terms of methods, materials, classroom strategies and assessment procedures should be such as to ensure that pupils leave school with very high levels of proficiency in Hindi/Regional Language(s) and English.
10. Teachers of Hindi and English may be required to have some knowledge of the regional language to encourage participation of the learners and in less bilingual tribal areas it should be essential to engage teachers who know the tribal language as well.
11. It is extremely important to produce interesting and challenging textbooks and other books covering a wide range of genres, themes and registers and provide for professionally trained teachers to ensure high levels of proficiency in different languages.
12. It is essential to have a holistic perspective on language pedagogy. Texts involving the use of language in a variety of contexts should constitute the basis of teaching.
13. In order to ensure the quality of teacher training programmes, it is imperative to build institutions that would ensure a rich crop of master trainers in the pedagogy of language. It is equally imperative to network with different NGOs who may have made significant innovations in language pedagogy.
14. Immediate efforts should be undertaken to decentralize language in education policy at both the intra and inter state levels. This process could begin with different kinds of flexibility in the implementation of the three-language formula while maintaining its essential spirit.
15. Multilingual classrooms, which are the most common scenario in India, should be seen as a resource rather than as an obstacle in education. Teachers should regard the classroom not only as a space for teaching but also as a site for learning. Multilingual and multicultural classrooms should be creatively used to create awareness about linguistic and cultural diversity.
16. Every possible effort should be made to preserve, sustain and develop minor, minority, tribal and endangered languages whose survival is increasingly threatened by the processes of rapid social change and globalization
17. Though efforts to eliminate religious, cultural and social biases should be the burden of the entire educational curriculum, language classrooms may prove to be the most subtle and most successful domains of desirable social changes in this regard and material producers may be encouraged to create responsible discourses in this regard.
18. A substantial part of our knowledge carries a distinct gender bias which is transmitted and consistently reconstructed through language. If we wish that our dream of a democratic society should become a reality, we must make every possible effort to eliminate gendered construction of knowledge.
19. Assessment procedures should neither be terminal in character nor focused merely on the knowledge of grammar and local reading comprehension. They should be continuous and reflect the recommendations made above including different aspects of linguistic diversity seen in different registers and genres and communicative tasks that cut across the curriculum.
20. While many of the *differently abled* learners [who may be physically or mentally challenged] may pick up the basic language skills through normal social interaction, and may have little difficulty in handling computers, they may be provided special

access to modern technology and specifically designed materials to assist their growth in attaining enhanced proficiency.

21. We suggest that NCERT, in close collaboration with other like-minded bodies like CIIL, Mysore provide for online interactive teaching of Indian Languages. In addition, relevant and interesting television programs may be created which will aid both language learning and metalinguistic awareness.
22. Since the role of languages across the curriculum is being increasingly recognized, it would be important for all teachers to undergo a special orientation course, which is focused on the nature, structure and function of language, and evolve strategies that will help share the responsibility for the development of learners and development of languages.
23. In order to encourage reading habits, every school must have a well-equipped library where every possible effort is made to involve children in the processes of reading and writing independent of their normal course work.
24. In the context of teaching English, it is important that it is not contextualized in a western ambience but is taught through a contextually rich local perspective.
25. Every possible effort should be made to encourage small research projects in the areas of language learning and language teaching methods.
26. It is important to build bridges in the type of language that is used across language textbooks and the textbooks of science and social science. The scientific and social concepts often remain incomprehensible to students because of language problems.

APPENDIX I

BIBLIOGRAPHY

Abdul Hamid, N. 2005. 'Syrian Students' Proficiency in English: A Social Psychological Perspective'. Unpublished Ph.D dissertation. University of Delhi. Delhi.

Agnihotri, R.K. 1979. 'Processes of Assimilation: A Sociolinguistic Study of Sikh Children in Leeds'. Unpublished D.Phil. Thesis. University of York.

Agnihotri, R.K. 1988. 'Errors as learning strategies'. ***Indian Journal of Applied Linguistics*** 14.1: 1-14.

Agnihotri, R.K. 1992. 'India: multilingual perspective'. In Nigel, T. (ed.), ***Democratically Speaking: International Perspective on Language Planning***. South Africa, Salt River: National Language Project.

Agnihotri, R.K. 1995. 'Teacher's pace in the classroom'. ***The Language Curriculum: Dynamics of Change (Vol.1.)***. Report of the International Seminar. Hyderabad: CIEFL.

Agnihotri, R.K., Khanna, A.L. 1994. (eds.), ***Second Language Acquisition: Socio-cultural and Linguistic Aspects of English in India (RAL1)***. New Delhi: Sage Publications.

Agnihotri, R.K., Khanna, A.L. 1995. (eds.), ***English Language Teaching in India: Issues and Innovations (RAL 2)***. New Delhi: Sage Publications.

Agnihotri, R. K. and Khanna, A. L. 1997. "Social psychological perspective on second language learning: A critique". In Singh, R. (ed.), ***Grammar, Language and Society***. New Delhi: Sage Publications.

Agnihotri, R.K., Khanna, A.L. and Mukherjee, A.1982. "Predictors of achievement in English tenses: a socio-psychological study". ***International Journal of Applied Linguistics 8.2***: 89-105.

Agnihotri, R.K., Khanna, A.L. and Mukherjee, A. 1983. ***Variations in the Use of Tenses in English: A Sociolinguistic Perspective***. New Delhi: ICSSR.

Agnihotri, R.K., Khanna, A.L. and S. Shukla. 1964. ***Prashika***. New Delhi: Ratna Sagar.

Agnihotri, R.K., Khanna, A.L. and Sachdev, I. (eds.), 1998. ***Social Psychological Perspectives in Second Language Learning (RAL 4)***. New Delhi: Sage Publications.

Agnihotri, R. K. and Sanjay Kumar. 2001. (eds.). ***bhasha, boli aur samaj: ek antah samvad.*** Delhi: Deshkal.

Agrawal, P. and Sanjay Kumar.2000. (eds.). ***hindi nai cal men dhali***. New Delhi: Deshkal.

Alderson, J.C. 1979. 'The close procedure and proficiency in English as a foreign language'. ***TESOL Quarterly 13.2***: 219-28.

Alderson, J.C. and Baretta, A. (eds.), 1992. ***Evaluating Second Language Education***. Cambridge: Cambridge University Press.

Alderson, J.C., Clapham, C. and Wall, D. 1995. ***Language Test Construction and Evaluation***. Cambridge: Cambridge University Press.

Allwright, D. and Bailey, K.M. 1991. ***Focus on the Language Classroom***. Cambridge: Cambridge University Press.

Allwright, R.L. 1981. 'What do we want teaching materials for?' ***ELT 36.***1: 5-18.

Anderson, R. W. (ed.), 1981. ***New Dimensions in Second Language Acquisition Research***. Rowley, Mass.: Newbury House.

Anthony, E.M. 1972. 'Approach, method and technique'. In Allen and Campbell (eds.), 1972. ***Teaching English as a Second Language***. Tata McGraw Hill.

Arora, G. L. 1995. ***Child-Centered Education for Learning without Burden***. Gurgaon: Krishna Publishing Company.

Atkinson, M. 1982. ***Explanations in the Study of Child Language Development***. Cambridge: Cambridge University Press.

Aurorin, V.1977. 'On the subject matter of social linguistics'. In Geracimora, L. (ed.), ***Theoretical Aspects of Linguistics***. Moscow: USSR Academy of Science.

Bachman, L.1989 'The development and use of criterion-referenced test of language program evaluation'. In Johnson, R.K. (ed.), ***The Second Language Curriculum***. Cambridge: Cambridge University Press. pp. 242-58.

Bachman, L.F. and Palmer, A.S. 1996. ***Language Testing in Practice***. Oxford: Oxford University Press.

Baker, C. 1988. ***Key Issues in Bilingualism and Bilingual Education***. Clevedon: Multilingual Matters.

Baker, C. 1993. **Foundations of Bilingual Education**. Clevedon: Multilingual Matters.

Baker, C. 2001. ***Foundations of Bilingual Education and Bilingualism***. Clevedon: Bilingual Matters.

Bambrough, P. 1994. ***Simulations in English Teaching***. Buckingham: Open University Press.

Bauman, Z. 2001. ***The Individuated Society***. Cambridge: Polity Press.

Beaumont, M. 1996. ***The Teaching of Reading Skills in Second/Foreign Language***. Patras: The Hellenic Open University.

Bialystok. E. 1978. "A theoretical model of second language learning". ***Language Learning 28***: 69-83.

Bloom, B.S. 1956. ***Taxonomy of Educational Objectives. Vol.1: Cognitive Domain***. New York: McKay.

Bourdieu, P. 1978 and 1993. 'What talking means'. ***Le Francais Aujourd Hui 41***: 4-20, 51-57.

Brass, P. 1974. Language, Religion, and Politics in North India. Cambridge: Cambridge University Press, 1974.

Brecht, R.D. and Ingold, C.W. 1988. ***Tapping a National Resource: Heritage Languages in the United States***. ERIC Clearing house on Languages and Linguistics, Washington, D.C.

Brown, D. H. 1980. ***Principles of Language Learning and Teaching***. New Jersey: Prentice-Hall, Inc.

Brown, K. 1984. ***Linguistics Today***. Suffolk: Fontana

Brown, J.D. 1996. ***Testing in Language Programs***. London: Prentice Hall.

Brumfit, C. 1984. ***Communicative Methodology in Language Teaching***. Cambridge: Cambridge University Press.

Brumfit, C.J and Johnson, K. 1979. ***The Communicative Approach to Language Teaching***. ELBS/Oxford University Press.

Brumfit, C.J. 1980. ***Problems and Principles of English Language Teaching***. Oxford: Oxford University Press.

Byram, M. 1997. ***Developing Intercultural Communicative Competence in Foreign Language Teaching: Curriculum Planning and Policy***. Report of Workshop 13. Graz: ECML.

Butler, J. 1990. *Gender Trouble: Feminism and the Subversion of Identity*. New York: Routeldge. Cameron, D. 1985. Feminism and Linguistic Theory. New York: St Martin's Press.

Canale, M and Swain. 1980. 'Theoretical bias of communicative approaches to second language teaching and testing'. ***Applied Linguistics 1***: 1-47

Carroll, J.B. 1956 (ed.), Language, Thought and Reality: Selected Writings of Benjamin Lee Whorf. New York: John Wiley and Sons.

Cenon, J. and Genesse, F. (ed.), 2001. ***Trends in Bilingual Acquisition***. John Benjamins.

Chomsky, N. 1957. ***Syntactic Structures***. The Hague: Mouton Co.

Chomsky, N. 1959. Review of Skinner's Verbal Behaviour. Language 35.1:26-58

Chomsky, N. 1972. ***Language and Mind***. New York: Harcourt Brace Jovanovich.

Chomsky, N. 1996. ***Powers and Prospects: Reflections on Human Nature and the Social Order***. Delhi: Madhyam Books.

Chomsky. N. 1965. ***Aspects of the Theory of Syntax***. Cambridge: MIT Press.

Chomsky, N. 1986. ***Knowledge of Language***. New York: Praeger

Chomsky, N. 1988. ***Language and Problems of Knowledge***. Cambridge, Mass: MIT

Chryshochoos, J.E. 1990. 'The Role of Theories of Language and Language Learning in the Pre-service, In-service, Training, Education and Development of Language Teachers'. Ph.D Thesis. School of English. University of Durham, England.

Chryshochoos, N.E. 1988. 'Learner Needs and Syllabus Design'. M.A. Dissertation. School of English. University of Durham, England.

Chryshochoos, N.E. 1991. 'Learners' awareness of their learning'. In James, C. and Garrett's, P. (eds.), ***Language Awareness in the Classroom***. London: Longman.

Cohen, A.1980. ***Testing Language Ability in the Classroom***. Rowley, Mass.: Newbury House.

Cohen, A.D. 1975. ***A Sociolinguistic Approach to Bilingual Education***. Rowley, Mass.: Newbury House Publication.

Common European Framework of Reference for Languages. 2001. ***Learning, Teaching, Assessment***. Council of Europe. Cambridge: Cambridge University Press.

Cooper, R.L. 1989. ***Language Planning and Social Change***. Cambridge: Cambridge University Press.

Corder, P. 1967. "Significance of learners' errors". ***International Review of Applied Linguistics 5***: 162-169.

Council of Europe 1985. ***Learning and Teaching Modern Languages for Communication***. Stratsbourg. Project No. 12.

Crawford, J. 1991. ***Bilingual Education: History, Politics, Theory and Practice***. Los Angels: Bilingual Education Series.

Crawhall, N. 1992. (ed.), ***Democratically Speaking***. Cape Town: National Language Project.

Crystal, D. 1987. ***The Cambridge Encyclopedia of Language***. Cambridge: Cambridge University Press.

Cummins, J and Danesi, M.1990. ***Heritage Languages: The Development and Denial of Canada's Linguistic Resources***. Our Schools/ourselves and Garamond Press, Toronto.

Cummins, J. 1976. 'The influence of bilingualism on cognitive growth: a synthesis of research findings and explanatory hypothesis'. ***Work Papers on Bilingualism 9***: 1-43.

Cummins, J. 1981b. 'The role of primary language development in promoting educational success for language minority students'. In California State Department of Education. ***Schooling and Language Minority Students: A Theoretical Framework***. Los Angeles: Evaluation, Dissemination and Assessment Center.

Cummins, J. 1984. ***Bilingualism and Special Education: Issues in Assessment and Pedagogy***. Clevedon: Multilingual Matters.

Cummins, J. 2001. ***Negotiating Identities: Education for Empowerment in a Diverse Society***. Ontario, CA: California Association for Bilingual Education.

Cummins, J. and Swain, M.1986. ***Bilingualism in Education***. London: Longman.

Das Gupta, J. 1970. ***Language Conflict and National Development: Group Politics and National language Policy in India***. Oxford University Press.

Davies, A. 1990. ***Principles of Language Testing***. London: Basil Blackwell.

Davies, A.1980. ***Principles of Language Testing***. Oxford: Pergamon Press.

Deligianni, A. et al. 2001. 'The first Balcan symposium on cultural understanding through EFL'. ***Bridges. Issue7.***

Delor, J. 1996. ***Learning: The Treasure Within***. Paris: UNESCO.

Dorian, N.C. 1981. ***Language Death***. Philadelphia: University of Pennsylvania Press.

Dougill, P. and Knott, R. 1988. ***The Primary Language Book***. Oxford: Oxford University Press.

Dua, H.R. 1985. ***Language Planning in India***. Delhi: Harnam Publishers.

Edge, J. 1989. ***Mistakes and Correction***. London: Longman.

Edge, J. and Richards, K. 1993 (eds.), ***Teachers Develop Teacher Research Papers in Classroom Research and Teacher Development***. London: Heinemann.

Edwards, V .1998. The ***Power of Babel: Teaching and Learning in Multilingual Classroom***. Stoke-on-Trent: Trentham Book.

Edwards, V. 1998. ***Multilingualism in the English Speaking World***. Oxford: Blackwell.

Edwards, V. and Walker, S. 1995. ***Building Bridges: Multilingual Resources for Children***. Clevedon: Multilingual Matters.

Ellis, R. 1985. ***Understanding Second Language Acquisition***. Oxford: Oxford University Press.

Fairclough, N. 1992. (ed.), ***Critical Language awareness***. Harlow: Longman.

Fishman, A.J. 1978. (ed.), ***Advances in the Study of Societal Multilingualism***. The Hague: Mouton.

Fishman, J.A. 1966. ***Language Loyalty in the United States***. The Hague: Mouton.

Fowler, R. et al. eds. 1979. Language and Control. London: Routledge.

Frankenberg-Garcia, A. 1999. 'Providing student writers with pre-text feedback'. ***ELT 53.2***: 101-106.

Freeman, R.1998. ***Bilingual Education and Social Change***. Clevedon: Multilingual Matters.

Gal, S. 1979. ***Language Shift: Social Determinants of Linguistic Change in Bilingual Austria***. New York: Academic Press.

Gardner, H. 1993. ***Multiple Intelligences: The Theory in Practice***. New York: Basic Books.

Gardner, R.C. 1977. "Social factors in second language acquisition and bilinguality". In Coons, W.H., Taylor, D.M. and Tremblay, M.A. (eds.), ***The Individual Language and Society in Canada***. Ottawa: The Canada Council.

Gardner, R.C. 1985. ***Social Psychology and Second Language Learning: The Role of Attitudes and Motivation***. London: Edward Arnold.

Gardner, R.C. 1988. "The socio-educational model of second-language learning: Assumptions, findings and issues". ***Language Learning 38***: 101-126.

Gardner, R.C. and Lambert, W.E. 1972. ***Attitudes and Motivation in Second Language Learning***. Rowley Massachusetts: Newbury House Publishers.

Gower, R., Phillips, D. and Walters, S. 1995. ***Teaching Practice Handbook***. Oxford: Heinemann.

Grundy, P. 1993. ***Newspapers***. Oxford: Oxford University Press.

Guha, R. 2005. 'Hindi against India'. In ***The Hindu***. New Delhi. January, 16th, 2005.

Gumperz, J.J. and Hymes, D.H. 1972 (eds.), ***Directions in Sociolinguistics: The Ethnography of Communication***. New York: Holt, Rinehart and Winston.

Gupta, A. 1995. Medium of instruction in a bilingual context. In Agnihotri, R. K. and Khanna, A. L. ed. RAL 4, New Delhi: Sage, 201-211.

Gupta, R.S. 1994. 'Selecting reading materials: some key considerations'. In Agnihotri, R.K., Khanna, A.L. 1994. (eds.), ***Second Language Acquisition***. New Delhi: Sage Publications.

Habermass, J. 1998. ***On the Pragmatics of Communication***. Cambridge, Mass.: MIT Press.

Habermass, J. 1998. ***The Philosophical Discourse of Modernity***. Cambridge, Mass.: MIT Press.

Hakuta, K. 1986. ***Mirror of Language: The Debate on Bilingualism***. New York: Basic Books.

Halliday, M. A. K. and Hasan, R.1976. ***Cohesion in English***. London: Longman.

Halliday, M.A .K.1975. ***Learning How to Mean***. London: Edward Arnold.

Harmer, J. 1995. ***The Practice of English Language Teaching***, London: Longman.

Harris, D.P. 1969. ***Testing English as a Second Language***. New York: McGraw Hill.

Harrison, A. 1983. ***A Language Testing handbook***. London: Macmillan.

Heugh, K. et al. 1995. (eds.), ***Multilingual Education for South Africa***. Johannesburg: Heinemann.

Hill, G. 1998. ***Advanced Psychology Through Diagrams.*** Oxford Revision Guides: A' Level Psychology. Oxford: Oxford University Press.

Horwitz, E.K., Horwitz, M.B. and Cope, J. 1986. "Foreign language classroom anxiety". ***The Modern Language Journal*** 70: 125-132.

House, S. 1997. ***An Introduction to Teaching English to Children***. New York: Richmond Publishing.

Hughes, A.1989. ***Testing for Language Teachers***. Cambridge: Cambridge University Press.

Hutchison, T and Torres, E. 1994. The textbook as an agent of change. ***ELT Journal*** 48: 315-328

Hyland, K. 1990. 'Providing productive feedback'. ***ELT 44.4***.

Illich, I. 1981. 'Taught mother language and vernacular tongue'. In Pattanayak, D.P. 1981. ***Multilingualism and Mother Tongue Education***. Oxford University Press.

Itagi, N.H. and Singh, S.K. (eds.), 2002. ***Linguistic Landscaping in India***. Mysore: Central Institute of Indian Languages and mahatma Gandhi International Hindi University.

Illich, I. 1981. Peface to Pattanayak,1981. ***Multilingualism and Mother Tongue Education***. Oxford University Press.

Jesperson, O. 1922. ***Language: Its Nature, Development and Origin***. New York: W.W. Norton.

Jhingaran, D. 2005. ***Language Disadvantage: The Learning Challenges in Primary Education***. New Delhi: APH Publishing Corporation.

Jones, K. 1988. ***Interactive Learning Events: A Guide for facilitators***. London: Kogan Page.

Kirk, R. 1987. ***Learning in Action - Activities for Personal and Group Development***.

Oxford: Basil Blackwell Limited.

Khanna, A.L. 1983. A study of some learner variables in learning English as a second language. Ph.D. thesis, University of Delhi, Delhi.

Khanna, A.L. and Agnihotri, R.K. 1982. "Language achievement and some social psychological variables". ***CIEFL Bulletin 18.1&2***: 41-51.

Khanna, A.L. and Agnihotri, R.K. 1984. "Some predictors of speech skills: a socio-psychological study". ***International Journal of Dravidian Linguistics 13.2***: 229-51.

Khubchandani, L.M. 1983. ***Plural Languages, Plural Cultures***. East, West Center, University of Hawaii.

Khubchandani, L.M. 1988. ***Language in a Plural Society***. Delhi: Motilal Banarasidass and Shimla IIAS.

Kintsch, W. 1974. ***The representation of meaning in memory***. Hillsdale, N.J: Erlbaum.

Kintsch, W.1988. 'The role of knowledge in discourse comprehension: A construction-integration model'. ***Psychological Review 95***: 163-82

Krashen, S.D. 1981. ***Second Language Acquisition and Learning***. Oxford: Pergamon Press.

Krashen, S.D. 1982. ***Principles and Practice in Second Language Acqtisition***. Oxford: Pergamon Press.

Krashen, S.D. 1985. ***The Input Hypothesis***. Oxford: Pergamon Press.

Krashen, S.D. 1988. ***Second Language Acquisition and Second Language Learning***. Prentice Hall International (UK) Ltd.

Krashen, S.D.1976. "Formal and informal environments in language acquisition and language learning". ***TESOL Quarterly 10***: 157-168.

Kress, G. 1976. (ed.), ***Halliday: System and Function in Language***. Oxford University Press.

Kress, G. 1986. ***Linguistic Processes in Sociocultural Practice***. Oxford: Oxford University Press.

Krouse, M.A. 1992. ***Communicative English***. London: Maskew Miller Longman.

Kumar, K. 2001. ***skul ki hindi***. Patna: Rajkamal

Kumar, K. 2001. ***Prejudice and Pride: School Histories of the Freedom Struggle***. New Delhi: Viking/Penguin.

Labov, W. 1966. ***The Social Stratification of English in New York City***. Washington, DC: Centre for Applied Linguistics.

Labov, W. 1971. 'The notion of "System" in creole studies'. In Hymes, D.H. 1971(ed.). ***Pidginization and Creolization of Languages***. Cambridge: Cambridge University Press.

Labov, W. 1972. ***Sociolinguistic Patterns***. Philadelphia: University of Pennsylvania Press.

Lado, R. 1957. ***Linguistics Across Cultures***. Michigan: University of Michigan Press.

Lakoff, R. (1975). ***Language and Woman's Place***. New York: Harper & Row.

Lakoff, R. 1990. ***Talking power: The politics of language in our lives***. New York: Basic

Larsen-Freeman, D. 1986. ***Techniques and Principles in Language Teaching***. Oxford: Oxford University Press.

Lee, D. 1992. Competing Discourses. London: Longman

Le Page, R.B. and Tabouret-Keller, A. 1985. ***Acts of Identity***. Cambridge: Cambridge University Press.

Littlejohn, A. 1992. Why are ELT materials the way they are. Unpublished PhD thesis, Lancaster University

Littlejohn, G. (1992) 'Shattering the silence', ***Professional Investor***, May, pp. 20-22

Littlejohn, A. 1999. 'Language learning tasks and education'. ***English Teaching Professional 10***.

Littlewood, W. 1981. ***Communicative Language Teaching***. Cambridge: Cambridge University Press.

Long, G. 1996. ***Functional English Grammar***. Cambridge: Cambridge University Press.

Macnamara, J. (ed.), 1977. ***Language Learning and Thought***. New York: Academic Press. McLaughlin, B. 1987. ***Theories of Second Language Learning***. London: Edward Arnold.

Malamah-Thomas, A. 1987. ***Classroom Interaction***. Oxford: Oxford University Press.

McDonough, J. and Shaw, C. 1993. ***Materials and Methods in ELT: A Teachers' Guide***: Oxford: Blackwell.

Medgyes, P. and Malderez, A.1966. ***Changing Perspective in Teacher Education***. Oxford: Heinemann

Milanovic, M.1995. ***UCLES Studies in Language Testing Volumes 1, 2, 3, 4***. Cambridge: Cambridge University Press.

'Education Commission "Kothari Commission". 1964-1966. ***Education and National Development***. Ministry of Education. Government of India. 1966.

'Learning without Burden'. Report of the national Advisory Committee. Education Act. Ministry of HRD. Department of Education. October, 2004.

'National Policy on Education'. 1986. Ministry of HRD. Department of Education. New Delhi.

'Punjab School Education Board Calendar'. Vol.II. 2002. Academic Regulations. SAS Nagar: Mohali Publishers.

Mukherjee, A. 1981. Language Maintenance and Language Shift among the Panjabis and Bengalis in Delhi. Delhi: Bahri Publications.

Mukherji, N., Patnaik, B.N. and Agnihotri, R.K. 2000. ***The Architecture of Language***. Delhi: Oxford University Press.

Murphy, T. 1992. ***Music and Song***. Oxford: Oxford University Press.

Nagaraj, G. 1996. ***English Language Teaching***. Calcutta: Orient Longman.

NCERT 2001. 'National Curriculum from Work for School Education'. September, 2001. NCERT, Delhi.

Nehru, J. 'Form the function of language'. National Herald. Feb13th, 1949. Quoted in Gopal, S. and Iyenger, A. 2003 (eds.), ***The Essential Writings of J. Nehru***. Oxford: Oxford University Press.

Nunan, D. 1988. ***Syllabus Design***. Oxford: Oxford University Press.

Nunan, D. 1988. ***The Learner-Centered Curriculum: A Study in Second Language Teaching***. Cambridge: Cambridge University Press.

Nunan, D. 1989. ***Understanding Language Classrooms.*** Prentice Hall.

Nunan, D. 1991. ***Language Teaching Methodology***. London: Prentice Hall.

Nuttall, C. 1996. ***Teaching Reading Skills in a Foreign Language***. Oxford: Heinemann.

Oller, J.W. and Jonz, J. 1994. ***Cloze and Coherence***. Cranbury, N.J.: Associated University Press.

Oller, J.W. Jr. 1979. ***Language Tests at School***. London: Longman.

Oller, John. W. Jr. 1983. ***Issues in Language Testing Research.*** Rowley: Newbury House Publishers, Inc.

Pandit, P.B. 1969. 'Comments on J.J. Gumperz's paper: How can we describe and measure the behavior of bilingual groups?' In Kelly, L.G. (ed.), ***Description and Measurement of Bilingualism*** .Toronto: University of Toronto Press. pp. 255 – 256.

Pandit, P.B. 1972. ***India as a Sociolinguistic Area***. Poona: University of Poona.

Pandit, P.B. 1988. 'Towards a grammar of variation'. In Khubchandani, L.M. 1988 (ed.). ***Language in a Plural Society***. Delhi: Motilal Banarasidass and Shimla IIAS.

Papaconstantinou, A. 1988. ***Applied Linguistics: an Introduction to the Learning and Teaching of the Foreign Language***. English Department: University of Athens.

Papaefthymiou-Lytra, S. 1981. 'Communicating and Learning Strategies in English as a Foreign Language with Reference to the Greek Learner of English'. Ph.D. Thesis. Institute of Education. University of London.

Pattanayak, D.P. 1981. ***Multilingualism and Mother Tongue Education***. Oxford University Press.

Pattanayak, D.P. 1986. ***Study of Languages***. A Report. New Delhi: NCERT.

Peal, E. and Lambert, W.E. 1962. 'The relation of bilingualism to intelligence'. ***Psychological Monographs 76***.

Raskin, V. and Viser, I. 1987. ***Language and Writing: Application of linguistics to rhetoric and composition***. Norwood, N.J.: Ablex Publishing Corporation.

Richards, J. C. (ed.), 1978. ***Understanding Second and Foreign Language Learning: Issues and Approaches***. Rowley, Mass.: Newbury House.

Richards, J., Platt, J. and Weber, H. 1985. ***Longman Dictionary of Applied Linguistics***. London: Longman.

Richards, J.C. 1990. ***The Language Teaching Matrix***. Cambridge: Cambridge University Press.

Richards, J.C. and Rodgers, T.S. 1981. ***Approaches and Methods in Language Teaching***. University of Hawaii, Manoa: Cambridge University Press.

Robert, J. 1995. 'Self-directed classroom inquiry by teachers: known benefits, an assessment of criticizms, and implications for teacher-researcher activity'. ***The Language Curriculum: Dynamics of Change (Vol.1.)***. Report of the International Seminar. CIEFL.

Sachdeva, R. 2001. ***Language Education in Nagaland: Socio-linguistic Dimensions***. New Delhi: Regency Publications.

Saer, D. 1924. The effect of bilingualism on intelligence. ***British Journal of Psychology*** 14: 25-38.

Sahgal, A. 1983. 'A sociolinguistic study of the spoken English of the Delhi elite'. M.Phil. thesis. University of Delhi, Delhi.

Schumann, J. 1978a. ***The Pidginization Process***. Rowley, Mass.: Newbury House.

Scrivener, J. 1994. ***Learning Teaching***. Oxford: Heinemann.

Seminar. 2000. Redesigning Curricula: Special Issue No 493. New Delhi: Romeshraj Trust.

Sharma, P.G. and Kumar, S. 1977. (ed.), ***Indian Bilingualism***. Agra: Kendriya Hindi Sansthan.

Singh, R. 1997. (ed.), ***Grammar, Language and Society***. New Delhi: Sage Publications.

Singh, U.N. and Maniruzzaman. 1983. ***Diglossia in Bangladesh and Language Planning***. Calcutta: Gyan Bharati.

Skutnabb-Kangass, T. and Cummins, J. 1988. (eds.), ***Bilingual Education: From Shame to Struggle***. Clevedon: Multilingual Matters.

Spady, W. and Marshall, K. 1994. 'Light, not heat, on OBE'. ***The American School Board Journal 18***: 29-33.

Spolsky, B. 1978. ***Approaches to Language Testing***. Arlington, Va: Center for Applied Linguistics.

Sproat, R. 1984. ***A Scientific Curriculum in Linguistics for Use in Secondary Schools***. MIT: MS.

Sridhar, K.K. 1989. ***English in Indian Bilingualism***. New Delhi: Manohar.

Srivastava, R.N. 1979. 'Language movement against Hindi as an official language'. In Annamali, E. 1979 (ed.), ***Language Movements in India***. Mysore: CIIL.

Srivastava, R.N. 1988. 'Societal bilingualism and bilingual education: a study of the Indian situation'. In Paulston, C. (ed.), ***International Handbook of Bilingualism and Bilingual Education***. New York: Greenwood Press.

Srivastava, R.N. 1984 (ed.) ***bhashashastra ke sutradhar***. New Delhi: National Publishing House.

Steinberg, F.S. and Horwitz, E.K. 1986. "The effect of induced anxiety on the denotative and interpretive content of second language speech". ***TESOL Quarterly 20***: 131-136.

Stern, H.H. 1983. ***Fundamental Concepts of Language Teaching***. Oxford: Oxford University Press.

Stubbs, M. 1980. ***Language and Literacy: the sociolinguistics of reading and writing***. London: Rowley and Kegan Paul.

Tanner, R. and Green, C. 1998. ***Tasks for Teacher Education***. London: Longman.

Tewari, B.N., Chaturvedi, M. and Singh, B. 1972. (eds.). ***bhartiya bhashavigyan ki bhumika***. Delhi: National Publishing House.

Thompson, I. 1998. 'Bilingualism: Some Aspects of Bilingual Children's Communication Difficulties with Reference to First Language Maintenance and Second Language Improvement'. MA Dissertation. School of English. University of Durham, England.

Thornbury, S. 1999. ***How to Teach Grammar***. London: Longman.

Tomlinson, B. 1998a. ***Materials Development for Language Teaching***. Cambridge: Cambridge University Press.

Tomlinson, B. 2001. 'Materials development'. In Carter, R. and Nunan, D. (eds.), ***Cambridge Guide to Teaching English to Speakers of Other Languages***. Cambridge: Cambridge University Press.

Tomson, A.J. and Martinet A.V. 1991. ***A Practical English Grammar***. Oxford: Oxford University Press.

Trudgill, P. 1974. ***The Social Differentiation of English in Norwich***. Cambridge: Cambridge University Press.

Trueben, H.T. and Barnet-Mizrahi, C. 1979. (ed.), ***Bilingual Multicultural Education and the Professional***. Rowley, Mass.: Newbury House Publication.

UNDPA 2004'Human Development Report'. New Delhi. Oxford: Oxford University Press.

UNESCO 1953. 'The Use of Vernacular Language in Education'. Paris: UNESCO.

UNESCO 2003. 'Education in a Multilingual World'. UNESCO Education Position Paper. Paris, UNESCO.

UNESCO 2004. 'Education for All: The Quality Imperative'. EFA Global Monitoring Report. Paris. UNESCO.

Upshur, J. 1968. "Four experiments on the relation between foreign language teaching and learning" ***Language Learning 18***: 111-124.

Ur, P. 1996. ***A Course in Language Teaching***. Cambridge: Cambridge University Press.

Valette, Rebecca, M. 1967. ***Modern Language Testing.*** New York: Harcourt, Brace and World, Inc.

Vandyopadhyaya, P K. and R K Agnihotri. 2000. (eds). ***bhasha: bahubhashita aur hindi***. Delhi: Shilalekh.

Van Els, T. 1984. ***Applied Linguistics and the Learning and Teaching of Foreign Languages***. London: Edward Arnold.

Verma, M.K. 1998. (ed.), ***Sociolinguistics, Language and Society***. New Delhi: Sage Publications.

Vygotsky, L.S. 1978. ***Mind in Society: The Development of Higher Psychological Process***. Cambridge, Mass.: Harvard University Press.

Walker, S. 1984. ***Learning Theory and Behaviour Modification***. London: Methuen.

Wei, L. 2000. (ed.), ***The Bilingual Reader***. London: Routledge.

Weir, C. and Roberts, J. 1994. ***Evaluation in ELT***. Blackwell.

Weir, C.J. 1990. ***Communicative Language Testing***. New Jersey: Prentice Hall Regent.

Weisbrod, C. 2002. ***Emblems of Pluralism: Cultural Differences and the State***. Princeton, New Jersey: Princeton University Press.

West, R. 1999. ***Assessment in Language Learning***. University of Manchester Distance Learning Programme-MED in ELT.

Whiteley, W.H. 1971. (ed.). ***Language Use and Social Change: Problems with Multilingualism with Special Reference to Eastern Africa***. London: Oxford University Press.

Whitney, N. 1987. 'Editorial'. ***ELT 41.2***: p. 81.

Widdowson, H. G. 1984. 'The incentive value of theory in teacher education'. ***ELT 38.2***: 86-90.

Willis, J. 1981. ***Teaching English through English***. London: Longman.

Willis, J. 1998. 'Task-based learning'. ***English Teaching Professional 9***.

Willis, J. and Willis, D. 1989. ***The Collins Cobuild English Course. Level III***. Birmingham: Collins Cobuild.

Willis, J. and Willis, D. 1996. ***Challenge and Change in Language Teaching***. Oxford: Heinemann.

Wittgenstein, L. 1998. ***Philosophical Remarks***. Oxford: Basil Blackwell.

Zamel, V. 1985. 'Responding to student writing'. ***TESOL Quarterly 19.1***.

SOME JOURNALS

- Seminar (Issue no 493 of 2000 contains contributions by Krishna Kumar, Padma M. Sarangapani, Rohit Dhankar, Mohammad Talib, Sadhna Saxena, A.R. Vasavi, Shobha Sinha, Aruna Rathnam, Geetha B. Nambissan and a short select bibliography on Redesigning Curricula.)
- Sandarbh, Ekalvya, Hoshangabad (Hindi)
- Vimarsh, Digantar, Jaipur (Hindi)
- Contemporary Education Dialogue, Bangalore
- Srote, Ekalvya, Bhopal (Hindi)
- International Journal of Dravidian Linguistics, Kerala
- South Asian Language Review, New Delhi
- Indian Journal of Applied Linguistics
- Indian Linguistics, Pune
- Buniyadi Shiksha, Udaipur (Hindi)
- International Review of Applied Linguistics, USA
- Language Learning, USA
- Second Language Acquisition Research, USA
- Language, USA
- Linguistic Enquiry, USA
- Language in Society, USA
- International Journal of the Sociology of Language, USA
- ELT Journal, UK
- Modern Language Journal, USA
- Journal of Reading, USA
- Child Development, USA
- British Journal of Educational Studies, UK
- Journal of Verbal Learning and Verbal Behaviour, USA
- Cognition

- British Journal of Sociology of Education
- Applied Psycholinguistics

APPENDIX II

CLASSIFIED BIBLIOGRAPHY

MULTILINGUALISM AND MULTILINGUAL EDUCATION

Agnihotri, R.K. (1992); Baker, C. (1988, 1993, 2001); Bauman, Z. (2001); Brecht, R.D. and Ingold, C.W. (1988); Cenon, J. and Genesse, F. (2001); Cohen, A.D. (1975); Crawford, J. (1991); Crawhall, N. (1992); Cummins, J and Danesi, M. (1990); Cummins, J. (1976, 1984, 2001); Cummins, J. and Swain, M. (1986); Edwards, V. (1998); Edwards, V. and Walker, S. (1995); Freeman, R. (1998); Gardner, R.C. (1977); Hakuta, K. (1986); Heugh, K. et al. (1995); Katsaiti, L. (1983); Khubchandani, L.M. (1983); Pandit, P.B. (1969); Pattanayak, D.P. (1981); Sharma, P.G. and Kumar, S. (1977); Skutnabb-Kangass, T. and Cummins, J. (1988); Sridhar, K.K. (1989); Srivastava, R.N. (1988); Trueben, H.T. and Barnet-Mizrahi, C. (1979) and Wei, L. (2000).

SECOND/FOREIGN LANGUAGE LEARNING

Agnihotri, R.K., Khanna, A.L. and Sachdev, I. (1998); Agnihotri, R.K., Khanna, A.L. (1994); Agnihotri, R.K., Khanna, A.L. (1994); Anderson, R. W. (1981); Bialystok, E. (1978); Brown, D. H. (1980); Corder, P. (1967); Ellis, R. (1985); Gardner, R.C. (1988, 1985); Gardner, R.C. and Lambert, W.E. (1972); Horwitz, E.K., Horwitz, M.B. and Cope, J. (1986); Krashen, S.D. (1976, 1981, 1982, 1985); Macnamara, J. (1977); McLaughlin, B. (1987); Papaconstantinou, A. (1988); Richards, J. C. (1978); Van Els, T. (1984); Vygotsky, L.S. (1978); Rutherford, W. (1987) and Walker, S. (1984).

SECOND/FOREIGN LANGUAGE TEACHING

Agnihotri, R.K. (1994, 1999); Agnihotri, R.K. (1988); Agnihotri, R.K., Khanna, A.L. and Mukherjee, A. (1982, 1998); Allwright, R.L. (1981); Allen and Campbell (1972); Beaumont, M. (1996); Brown, D.H. (1980); Brumfit, C. (1984, 1980); Brumfit, C.J and Johnson, K. (1979); Canale, M and Swain.(1980); Edge, J. (1989); Edge, J. and Richards, K. (1993); Gower, R., Phillips, D. and Walters, S. (1995); Harmer, J. (1995); Hopkins, D. (1993); House, S. (1997); Krouse, M.A. (1992); Larsen-Freeman, D. (1986); Littlewood, W. (1981); Malamah-Thomas, A. (1987); McDonough, J. and Shaw, C. (1993); Medgyes, P. and Malderez, A.(1966); Nagaraj, G. (1996); Nunan, D. (1988, 1991); Nuttall, C. (1996); Richards, J.C. (1990); Richards, J.C. and Rodgers, T.S. (1981); Scrivener, J. (1994); Stern, H.H. (1983); Tanner, R. and Green, C. (1998); Thornbury, S. (1999); Tomlinson, B. (1998a); Ur, P. (1996); Willis, J. (1981) and Willis, J. and Willis, D. (1996).

LANGUAGE TESTING

Alderson, J.C., Clapham, C. and Wall, D. (1995); Alderson, J.C. and Baretta, A. (1992); Bachman, L. (1989); Bachman, L.F. and Palmer, A.S. (1996); Brown, J.D. (1996); Carroll, B. (1980); Cohen, A. (1980); Davies, A. (1990); Harris, D.P. (1969); Harrison, A. (1983); Henning, G. (1987); Hughes, A. (1989); Milanovic, M. (1995); Oller, J.W. Jr. (1979, 1983); Spolsky, B. (1978); Valette, Rebecca, M. (1967); Weir, C.J. (1990); and Weir, C. and Roberts, J. (1994).

THE LANGUAGE CURRICULUM

Byram, M. (1997); Nunan, D. (1980, 1988); Sproat, R. (1984); Burns, A. and Hood, S. (1994); Burton, J. and Nunan, D. (1988-91); Allwright, D. and Bailey, K.M. (1991); Olson, J. (1980); Stenhouse, L. (1975); Huda, N. (1992); Johnson, R.K. (1989). Apple, M. (1990); White, R. (1988); Candlin, C.N. (1983) and Munby, J. (1984).

GENERAL LINGUISTICS

Aitchison, J. (1983); Akmajian, A. and Heny, F.W. (1975); Berry, M. (1975); Bloomfield, L. (1933); Brown (1984); Chomsky, N. (1957, 1959, 1965, 1980, 1986, 1988, 2000); Chomsky, N. and Katz, J. (1975); Clark, H.H. and Clark, E.V. (1977); Cook, V.J. and Newson, M. (1996); de Saussure, F. (1916); Fodor, J. and Katz, J. (1964); Greenberg, G.H. (1978); Halliday, M.A.K. (1973, 1975); Hudson (1980); Jesperson, O. (1922); Joos, M. (1957); Katz, J. and Postal, M.P. (1964); Kress, G. (1976); Lenneberg, E. (1967); Lyons, J. (1972, 1977, 1981); Radford, A. (1990) and Robins, R.H. (1967, 1989).

CHILD EDUCATION AND DEVELOPMENT

Agnihotri, R.K. (1992); Arora, G.L. (1995); Atkinson, M. (1982); Bain, B.C. (1975); Cazden, C. (1981); Cummins, J. (1983b); Epstein, N. (1977); Freeman, R. (1998); Heugh, K. et al. (1995); Lindfors, J.W. (1980); Modiano, N. (1968); Pattanayak, D.P. (1981); Paulston, C. (1988); Rivera, C. (1984); Swain, M. and Wong Filmore, L. (1984); Trueba, H., Guthrie, G.P. and Au, K.H. (1981) and Vygotsky, L.S. (1962).

THE LANGUAGE LEARNER

Agnihotri, R.K. (1979, 1988); Agnihotri, R.K., Khanna, A.L. (1982, 1994, 1995); Agnihotri, R.K., Khanna, A.L. and Mukherjee, A. (1982, 1983); Agnihotri, R.K., Khanna, A.L. and Sachdev, I. (1998); Chryshochoos, N.E. (1991); Corder, P. (1967); Edge, J. (1989); Gardner, R.C. (1985, 1988); Gardner, R.C. and Lambert, W.E. (1972); Horwitz, E.K., Horwitz, M.B. and Cope, J. (1986); Khanna, A.L. (1983); Krashen, S.D. (1976, 1981, 1982, 1985); Nunan, D. (1988);

APPENDIX III

STATE WISE 'IDEAL LANGUAGE IN EDUCATION' CHARTS

Ideal Chart of Languages in School: West Bengal

Class	Medium	Compulsory Subject	Elective	Classical	Foreign
1	MT	MT	English/Regional Language or language of Minorities	X	X
2	MT	MT	"	X	X
3	MT	MT	"	X	X
4	MT	MT	"	X	X
5	MT	MT	"	X	X
6	MT	MT, English	Regional language/Classical Language/Foreign	Not Compulsory	Elective

7	MT	MT, English	"	"	"
8	MT	MT, English	"	"	"
9	MT	MT, English	"	Not Compulsory	"
10	MT	MT, English	"	"	"
11	English	MT, English	"	"	"
12	English	MT, English	"	"	"

Ideal Chart of Languages in School: Rajasthan

Class	Medium	Compulsory	Elective	Classical	Foreign
1	MT	Hindi	X	X	X
2	MT	Hindi	X	X	X
3	MT	Hindi	X	X	X
4	MT	Hindi+English	X	X	X
5	MT	Hindi+English	X	X	X
6	MT	Hindi+English	X	Sanskrit	X
7	MT	Hindi+English	X	Sanskrit	X
8	MT	Hindi+English	X	Sanskrit	X
9	MT	English	Hindi	Hindi or Sanskrit	French/ German
10	MT	English	Hindi	Hindi or Sanskrit	"
11	English	English	Hindi	X	"
12	English	English	Hindi	X	"

Ideal Chart of Languages in School: Kerala

Class	Medium	Compulsory Subject	Elective	Classical	Foreign
1	MT	SL/RL (SL=Malayalam; RL=Tamil, Kannada)	Arabic for Muslim Students	X	X
2	MT	"	"	X	X
3	MT	Oral English	"	X	X
4	MT	Oral English	"	X	X
5	MT	SL/RL+ English+Hindi	Elective Classical Language(Arabic, Urdu, Sanskrit, English)	X	X
6	MT	"	"	X	X
7	MT	"	"	X	X
8	Mother Tongue or English	"	"	X	X
9	"	"	"	X	X
10	"	"	"	X	X
11	"	SL/RL + English	Sub-elective: any other Indian Language or Foreign Language	X	X
12	"	"	"	X	X

Ideal Chart of Languages in School: Uttar Pradesh

Class	Medium	Compulsory Subject	Elective	Classical	Foreign
1	MT	Hindi and English	X	X	X
2	"	"	X	X	X
3	"	"	X	X	X
4	"	"	X	X	X
5	"	"	X	X	X
6	Hindi	English	Urdu	Sanskrit/Arabic	X
7	"	"	"	"	X
8	"	"	"	"	X
9	"	"	"	"	French
10	"	"	"	"	"
11	English	"	X	X	X
12	"	"	X	X	X

Ideal Chart of Languages in School: Karnataka

Class	Medium	Compulsory Subject	Elective	Classical	Foreign
1	MT	RL	X	X	X
2	"	"	X	X	X
3	"	"	X	X	X
4	"	"	X	X	X
5	RL	English	Sanskrit	X	X
6	"	"	"	X	X
7	"	"	"	X	X
8	English	RL	Sanskrit/Hindi/ Other RL	X	X
9	"	"	"	X	X
10	"	"	"	X	X
11	"	RL/Hindi	"	X	X
12	"	"	"	X	X

Ideal Chart of Languages in School: North India

Class	Medium	Compulsory Subject	Elective	Classical	Foreign
1	MT	MT and English (Oral till II)	X	X	X
2	MT	"	X	X	X
3	MT	"	X	X	X
4	MT	"	X	X	X
5	MT	"	X	X	X
6	RL/NL	Hindi+ English+another language except RL	Sanskrit as MIL (optional)	X	X
7	"	"	"	X	X
8	"	"	"	X	X
9	"	RL+English	"	Sanskrit, Tamil, Latin (compulsory)	X
10	"	"	"	"	X
11	"	Any language other than RL	English (optional)	Sanskrit (optional)	optional
12	"	"	"	"	"

NFG
Chart of Suggested Provision of Indian Languages in the School Curriculum

Class	Medium	Compulsory Subject	Elective	Classical	Foreign
1	Mother Tongue(s)	Mother Tongue(s)/ Regional Language(s)/ State Language			
2					
3		"			
4		"			
5		"			
6	MT(s)/RL(s)/ State Language(s)	(Regional Language(s) /State Language) 1.MT(s)/RL(s)/State) Languages(s 2.Hindi (if not studied as L1) 3.English	MIL including Sanskrit		
7	"				
8	"	"			
9	MT(s)/RL(s)/" State language(s) / Hindi/English	"	Sanskrit/Arabic /Persian /Tamil/Latin		
10					
11	""	Any one language- MT/RL/Hindi/English		""	Any Foreign language
12					

- MT(s) = Mother tongues including the languages used at home, in the extended family, peer group and the neighborhood.
- RL(s) = Regional Languages spoken in different parts of each state irrespective of whether they are recognized by the state.
- ST(s) = State languages include officially state-recognized languages

APPENDIX IV

RESPONSES RECEIVED DURING THE MEETINGS OF THE NFG

Dr. S Radhakrishnan

Many observers believe that the world is experiencing a mass extinction of cultures, a crisis as profound as the loss of biological species. There are many barometers of cultural diversity, including religion, but the best indicator of the health of the world's cultures may be the state of its languages.

Some languages are growing. English has exploded as the lingua franca of science, commerce, diplomacy, and pop culture. Other languages are fading. "More than half of the 6,000 or so languages currently spoken are unlikely to survive the next century," says Douglas Whalas Whalen of the Endangered Language Fund at Yale. About half have fewer than 10,000 speakers. A quarter has fewer than 1,000. Many blame language extinction on GLOBALISATION-a growing uniformity of cultures fueled by telecommunications and global economy.

India is no exception. The importance of Indian languages, the rich cultural carriers is loosing. This has to be stopped by encouraging the study of Indian languages as first languages. This country has taught that mother and motherland are greater than the heaven. I quote Will Durant, American philosopher-

"India was the motherland of our race, and Sanskrit the mother of Europe's languages; she was the mother of our philosophy; mother, through the Arabs, of much of our mathematics; mother, through the Buddha, of ideals embodied in Christianity; mother, through the village community, of self-government and democracy."

A child can pick up two or three languages in its early years very easily. . While the child learns its mother tongue naturally, without any effort, because of the exposure to the language, English can be taught through developing the skills of listening and speaking in the early stages. Once the child masters these two skills, reading and writing skills must be introduced gradually making the good literature available and within the reach of the child.

I remember reading about Helen Keller, how Miss Sullivan Macy "The Miracle Teacher" turned a near savage girl with no senses into a responsible human being and succeeded in awakening her marvelous mind just by making connections between words and things, a difficult task for a child with no senses to learn. Not only this, she also built connections for difficult concepts through nature study and by reading many books to her in French, German, Latin, Greek-philosophy, history, literature, and economics-the best thoughts of men and the news of their achievements. She gave the key to all languages which she used and acquired the rich heritage of the world and became the WORLD CITIZEN.

Decades of research demonstrate that enjoying reading and reading well are the biggest factors in a child's school success. Good readers make great students. They score higher on achievement tests at every level, in all subjects, including Maths and Science. Good readers have better vocabularies. One study showed that when teachers used more complex speech, very young children learned to create more complex sentences themselves. **From third standard on, kids need to learn about 300d new words a year- that's eight new words a day. And it takes at least four exposures to make a word their own.**

Reading as many stories, poems, biographies, autobiographies, plays etc as possible should become essential part of the school system.

Good readers start out ahead. Reading scores in first standard are a key indicator of school success in the final year of school. Meaning that what happens in the VERY EARLY YEARS has a lasting effect on learning.

Academic achievement certainly isn't the only reason to nurture reading skills. For one thing, there's the pure joy of reading. "Children can find companionship in books, counsel, solace and delight. Reading can give the child the magic moments of listening to the quiet music of the written word and much more."

IN A NUTSHELL

A. Indian language s to protect our culture
B. English language to develop scientific attitude among children
C. Primary school must be designed to develop more listening skills till standard two and more reading skill from standard three.
D. Ensure the development of word power-at least eight words per day.
E. Rich content books for the school library at primary level.

Sources: National Geography, Reader's Digest.

(Other responses in appendix IV and appendix V to be given later)

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EXECUTIVE SUMMARY AND RECOMMENDATIONS

English in India is a global language in a multilingual country (sec.I). A variety and range of English teaching situations prevail here owing to the twin factors of teacher proficiency in English, and pupils' exposure to English outside school. The level of introduction of English is now a matter of political response to people's aspirations rather than an academic or feasibility issue. While endorsing prevailing academic opinion for a later but more effective introduction of English (supporting this with an assessment of the "critical period" or "sensitive window" hypothesis in sec.IV.1), we also respond to current realities by describing what is achievable in given situations, supplemented with affirmative action interventions where necessary (sec.III.2.).

The goals for a language curriculum (sec.II) are twofold: attainment of a basic proficiency, such as is acquired in natural language learning, and the development of language into an instrument for abstract thought and knowledge acquisition through (e.g.) literacy. This argues for an across-the-curriculum approach that breaks down the barriers between English and other subjects, and other Indian languages. At the initial stages, English may be one of the languages for learning activities that create the child's awareness of the world; at later stages, all learning happens through language. Higher-order linguistic skills generalize across languages: reading (e.g.) is a transferable skill. Improving it in one language improves it in others, while mother-tongue reading failure adversely affects second language reading. English does not stand alone. The aim of English teaching is the creation of multilinguals who can enrich all our languages: this has been an abiding national vision (sec.III.4).

Input-rich communicational environments are a prerequisite for language learning (sec. III). Inputs include textbooks, learner-chosen texts, and Class Libraries allowing for a variety of genres: print (e.g. Big Books for young learners), parallel books and materials in more than one language, media support (learner magazines/newspaper columns, radio/audiocassettes), and "authentic" materials. The language environment of disadvantaged learners needs to be enriched by developing schools into community learning centres. A variety of successful innovations exist whose generalizability needs exploration and encouragement. Approaches and methods need not be exclusive but may be mutually supportive within a broad cognitive philosophy (incorporating Vygotskian, Chomskyan and Piagetian principles). Higher order skills (including literary appreciation and the role of language in gendering) can be developed once fundamental competencies are ensured.

Teacher Education needs to be on-going and on-site (through formal or informal support systems), as well as preparatory. Proficiency and professional awareness are equally to be promoted, the latter imparted, where necessary, through the teachers' own languages (sec.III.6).

Language Evaluation (sec. III.7) need not be tied to "achievement" with respect to particular syllabi, but must be reoriented to measurement of *language proficiency*. We discuss some ways of conducting ongoing evaluation of language proficiency. *National benchmarks for language proficiency* need to be evolved preliminary to designing a set of optional English Language Tests that will balance curricular freedom with the standardization of evaluation that certification requires, and serve to counter the current problem of English (along with mathematics) being a principal reason for failure at class X. A student may be allowed to "pass without English" if an alternative route for English certification (and therefore instruction) can be provided outside the regular school curriculum.

RECOMMENDATIONS

- **Teachers**

  1. All teachers who teach English should have basic proficiency in English.
  2. All teachers should have the skills to teach English in ways appropriate to their situation and levels, based on a knowledge of how languages are learnt.

  These two recommendations have implications for the content of pre-service and in-service teacher education programmes.

- **Curriculum**

  1. A variety of materials should be available to provide an input-rich curriculum which focuses on meaning.
  2. Multilinguality should be the aim in English-medium as well as regional-medium schools. Similarly, a language-across-the-curriculum perspective should be adopted.

  This has implications for textbook design and choice of appropriate methods (e.g the provision of class libraries and media support).

- **Evaluation**

  1. Evaluation is to be made an enabling factor for learning rather than an impediment. Ongoing assessment should document a learner's progress through the portfolio mode. Language evaluation need not be tied to "achievement" with respect to particular syllabi, but must be reoriented to measurement of language proficiency.
  2. National benchmarks for language proficiency should be evolved as a preliminary to the preparation of a set of English language tests.

A GLOBAL LANGUAGE IN A MULTILINGUAL COUNTRY

1. WHY ENGLISH?

English is in India today a symbol of people's aspirations for quality in education and a fuller participation in national and international life. Its colonial origins now forgotten or irrelevant, its initial role in independent India, tailored to higher education (as a 'library language,' a 'window on the world') now felt to be insufficiently inclusive socially and linguistically, the current status of English stems from its overwhelming presence on the world stage and the reflection of this in the national arena. It is predicted that by 2010, a surge in English language learning will include a third of the world's people

(Graddol 1997).[1] The opening up of our economy in the 1990s has coincided with an explosion in the demand for English in our schools, because English is perceived to open up opportunities (Das 2005).

2. ENGLISH IN OUR SCHOOLS

i. The level of introduction of English

The visible impact of this presence of English is that it is today being demanded by *everyone* at the very *initial* stage of schooling. The English teaching profession has consistently recommended a relatively late (class IV, V, or VI) introduction of English, and this is reflected in spirit in policy documents. The dissatisfaction with this recommendation is evident in the mushrooming of private English-medium schools and the early introduction of English in state school systems.[2] The popular response to systemic failure has been to extend downwards the very system that has failed to deliver. The level of introduction of English has now become a matter of political response to people's aspirations, rendering almost irrelevant an academic debate on the merits of a very early introduction. There are problems of systemic feasibility and preparedness: e.g. finding the required number of competent teachers. But there is an expectation that the system should respond to popular needs, rather than the other way round.

We address this question, therefore, in various ways. First, we hope through multilingualism to counter some possible ill-effects such as the loss of one's own language(s), or the burden of sheer incomprehension. Second, we describe what can realistically be achieved in given situations, supplemented with affirmative action interventions where necessary: the aim is to identify delivery systems for comprehensible input to the child, whether in the classroom or outside it. For a fuller understanding of the issues around the early introduction of English we have included as assessment of the "critical period' or 'sensitive window" hypothesis to show that this does not entail a very early introduction of English.

ii. The variety and range of English teaching in India

The teaching and learning of English today is characterized by (on the one hand) the diversity of schools, and linguistic environments supportive of English acquisition; and (on the other hand) by systemically pervasive classroom procedures of teaching a textbook for success in an examination, modulated by teacher beliefs influenced to varying degrees by inputs from the English language teaching profession.[3]

One way to broadly characterize English teaching situations in India is in terms of (a) the teacher's English language proficiency (TP), and (b) the pupils' exposure to English outside school, i.e. the availability of English in the environment for language acquisition (EE). (The reference for these parameters for school classification is: Nag-Arulmani, 2000.) Kurrien (2005) thus identifies examples for the four types of schools below.

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[1] Included in this estimate are 150 million Indian children in primary school, and 120 million of their Chinese counterparts: a comment on the embedding of English within school systems in Asia. However, the demand for English may well peak by 2050, more people having learnt it already; and Arabic, Chinese, German, Hindi and Spanish having also emerged as languages of the future.

[2] A 2003 NCERT study shows that English is introduced in class I or class III by 26 states or union territories out of 35. Only seven states or union territories introduce it in class IV or V (Khan 2005).

[3] English may have far better institutional arrangements to support its teaching than other subjects (but see n. 19, on distinguishing the industry of English teaching from questions of second language acquisition).

1) ↑↑TP, ↑↑EE (e.g. *English medium private/ government-aided elite schools)*: proficient teachers; varying degrees of English in the environment, including as a home or first language
2) ↑TP, ↑EE (e.g. *New English medium private schools* many of which use both English and other Indian languages): teachers with limited proficiency, children with little or no background in English, parents aspire to upward mobility through English
3) ↓TP, ↓EE (e.g. *Government-aided regional medium schools*): schools with a tradition of English education along with regional languages, established by educational societies, with children from a variety of backgrounds
4) ↓↓TP, ↓↓EE (e.g. *Government regional medium schools run by district and municipal education authorities)*: They enroll the largest number of elementary school children in rural India. They are also the only choice for the urban poor (who, however, have some options of access to English in the environment). Their teachers may be the least proficient in English of these four types of schools.

While these examples suggest a rough correlation between type of school management and the variables of teacher proficiency and environmental English, wide variation also obtains *within* each of these school-types. Private English medium schools may differ in the learning opportunities they offer, and this may be reflected in differential language attainment (Nag-Arulmani 2005): pupils in (e.g.) schools with class libraries read better than those in schools where reading is restricted to monotonous texts and frequent routine tests of spelling lists. Mathew (1999:41) found, in a curriculum implementation study, that the 2700–odd schools affiliated to the CBSE differ in the "culture" arising from "the type of management, funding, geographic location, salary structure, teacher motivation and competence, the type of students they cater for and the type of parents." Prabhu (1987:3) suggests that "typologies of teaching situations ... should thus be seen as an aid to investigating the extent of relevance of a pedagogic proposal," rather than as absolute categories.

iii. ELT (English Language Teaching) in India

Traditionally, English was taught by the grammar-translation method. In the late 1950s, structurally graded syllabi were introduced as a major innovation into the state systems for teaching English (Prabhu 1987: 10). The idea was that the teaching of language could be systematized by planning its inputs, just as the teaching of a subject such as arithmetic or physics could be. (The structural approach was sometimes implemented as the direct method, with an insistence on monolingual English classrooms.) By the late 1970s, however, the behavioral-psychological and philosophical foundations of the structural method had yielded to the cognitive claims of Chomsky for language as a "mental organ." [4]

There was also dissatisfaction within the English-teaching profession with the structural method, which was seen as not giving the learners language that was "deployable" or usable in real situations, in spite of an ability to make correct sentences in classroom situations. In hindsight, the structural approach as practiced in the classroom led to a fragmentation and trivialization of thought by breaking up language in two ways: into structures, and into skills. The form-focused teaching of language aggravated the gap between the learner's "linguistic age" and "mental age" to the point where the mind could no longer be engaged.[5]

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[4] Chomsky made a fundamental distinction between the conscious learning of a kind of knowledge that is constructed culturally through painstaking cooperative effort over time (such as scientific knowledge), and knowledge that seems to naturally unfold in the human mind in the presence of experience, where the complexity of the system that is learnt far outstrips what has environmentally been presented. This mismatch is sometimes referred to as "Plato's problem."

The emphasis thus shifted to teaching language use in meaningful contexts. British linguists argued that something more than grammatical competence was involved in language use; the term "communicative competence" was introduced to signify this extra dimension.[6] The attempt to achieve communicative competence assumes the availability of a grammatical competence to build on, and indeed, the communicative method succeeds best in the first category of school described above, introducing variety and learner-involvement into classrooms where teachers (and learners) have confidence in their knowledge of the language, acquired through exposure. However, for the majority of our learners, the issue is not so much communicative competence as the acquisition of a basic or fundamental competence in the language (Prabhu 1987:13). Input-rich theoretical methodologies (such as the whole language, the task-based, and the comprehensible input and balanced approaches) aim at exposure to the language in meaning-focused situations, so as to trigger the formation of a language system by the mind.

II. GOALS FOR A LANGUAGE CURRICULUM

A national curriculum can aim for

- a cohesive curricular policy based on guiding principles for language teaching and acquisition, which allows for a variety of implementations suitable to local needs and resources; and which provides illustrative models for use.

A consideration of earlier efforts at curriculum renewal endowed some of our discussion with an uneasy sense of *déjà vu*. However, we hope that current insights from linguistics, psychology and associated disciplines have provided a principled basis for some workable suggestions to inform and rejuvenate curricular practices.

English does not stand alone. It needs to find its place

- **along with other Indian languages**
    i. in regional medium schools: how can children's other languages strengthen English teaching/learning?
    ii. in English medium schools: how can other Indian languages be valorized, reducing the perceived hegemony of English?

- **in relation to other subjects**

    a language-across-the-curriculum perspective is perhaps of particular relevance to primary education. Language is best acquired through different meaning-making contexts, and hence all teaching is in a sense language teaching. This perspective also captures the centrality of language in abstract thought in secondary education: whereas in the initial stages contextual meaning supports language use, at later stages meaning may be arrived at solely through language.

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[5] Moreover, the planned and systematized presentation of language inputs was later shown to be out of step with learners' internal learning sequences. The relationship between the language presented and the system internalized is non-linear, being mediated by the learners' mental grammar.

[6] We note (however) that the Chomskyan use of the term competence in fact subsumes both systematicity ("grammaticality"), and acceptability. It denotes the ability to use language in a variety of contexts spontaneously and appropriately.

The aim of English teaching is the creation of multilinguals who can enrich all our languages: this has been an abiding national vision. The multilingual perspective also addresses concerns of language and culture, and the pedagogical principle of moving from the known to the unknown.

1. LANGUAGE ACQUISITION INSIDE AND OUTSIDE THE CLASSROOM

Second Language pedagogy, more than the teaching of any other curricular subject, must meet the most stringent criterion of universal success: the spontaneous and appropriate use of language for at least everyday purposes. This is a feat achieved in one's own language(s) by every pre-school child (Chomsky 1975). It is this "minimum level of proficiency" (which can however be shown to require a mental grammar of remarkable sophistication, that allows for the comprehension and production of language in "real time") that the person on the street aspires to: to "speak English," as against passing examinations in it merely, or knowing its grammar.[7]

- Can the English classroom replicate the universal success in acquisition of basic spoken language proficiency that a child spontaneously achieves outside the classroom, for the languages in its environment? If so, how?

Other spoken language skills in limited domains (e.g. for the travel and tourism industry) would build on such a basic proficiency. A common cognitive academic linguistic proficiency

Language in education would ideally and ordinarily build on such naturally-acquired language ability, enriching it through the development of literacy into an instrument for abstract thought and the acquisition of academic knowledge. We can then speak of a "cognitive academic linguistic proficiency" (cf. Cummins 1979) as language and thinking skills that build on the basis of a child's spontaneous knowledge of language. This is a goal of language education, and education through language. (Most often this discussion has been in the context of language education in the mother tongue.)

- Such cognitive and academic skills (moreover) are arguably transferable across languages, to a second language.

This transferability is one of the premises for recommending a relatively late introduction of English: that language-in-education proficiency, developed in the child's own languages, would then naturally extend to a new language. The dissatisfaction with this recommendation is attributable to two factors:

(i) the unsatisfactory achievement levels of academic linguistic proficiency in the *first* language(s) in e.g., reading and writing, thus the failure to provide an academic base for the second language. There are data to show (Nag-Arulmani 2005) that 40% of children in small towns, 80% of children in tribal areas, and 18% of children in urban schools, cannot read in their own language at the primary stage; these disparities widen and translate into general academic failure at later stages.

(ii) the failure to ensure the spontaneous working knowledge of English on which higher-order skills (such as reading with inferential comprehension, and writing with conceptual clarity) can be built.

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[7] Merely in terms of number of words. Aitchison (1988) estimates an hour of conversation to require 5000 words, and a radio talk to require 9000 words.

Within the eight years of education guaranteed to every child, it should be possible in a span of about four years to ensure basic English language proficiency. This would include basic literacy skills of reading and writing. But for this the teaching of languages in general must achieve a better success in our schools, for literacy skills are transferable. Alternatively, if English is insisted on as a medium at very early stages, its teaching should ensure better success in literacy in other languages, as documented by West (1941).

III. THE SHAPE OF A CURRICULUM: RESOURCES AND PROCEDURES

1. Input-rich environments

Input-rich communicational environments are a prerequisite for language learning. Languages are learned implicitly, by comprehending and communicating messages, either through listening or reading for meaning. We suggest a comprehensible-input rich curriculum that lays the foundation for spontaneous language growth, with understanding spoken and written language as precursors to language production (speech and writing). We also suggest how literacy may be meaningfully integrated into such a curriculum. We have already touched on the connection between literacy in English and in other school languages; in this section the twin perspectives of multilingualism and language-across-the-curriculum occur as recurrent themes.

A number of researchers (Prabhu 1987, Krashen 1985, Elley and Mangubhai 1983) have stressed that language is acquired when attention is focused not on language form, but on the meaning of messages. On this common ground stand such diverse innovations as the Bangalore Project or Communicational Teaching Project (Prabhu 1987), the Communicative Approach (Widdowson 1978), the Natural Approach (Krashen and Terrell 1983) and the Whole Language movement. Moving specifically into the area of literacy acquisition a number of researchers have stressed for a balance of explicit skills instruction and a strongly meaningful language learning environment (Adams, 1990; Snow, Burns and Griffin, 1998; Stanovich, 2000). The focus for literacy development needs to be both on skills and meaning).

The role of meaningful language exposure or "input" for the mind to work on is acknowledged by all cognitive theories of learning and language learning (as opposed to behaviorist theories of learning as habit-formation). The "burden of languages" (as of all education) is the burden of incomprehension. This happens when language is taught for its own sake as a set of forms or rules, and not introduced as the carrier of coherent textual meaning: it becomes another "subject" to be passed.[8]

The question is how the learner can receive meaningful language input that is appropriate to her or his age and knowledge of language or readiness for language skills, given the variety and range of English-learning situations in India. Such input must be provided at least by the classroom, but can also be made available to learners at their own initiative, in a variety of ways; the class and its teacher need not be a limiting factor to learning. The language environment of disadvantaged learners needs to be enriched in particular ways. A variety of successful innovations in this regard exist in this country; their generalizability beyond their immediate locales needs exploration and encouragement: e.g. Interactive Radio Instruction, the Task-based Communicational Approach, Whole Language narrative programmes. We try to describe such **success stories**.

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[8] That language is being learnt through mere exposure, when it is not being taught as language, is evident from the relative success of English-medium schools, where additional English input comes (apart from societal exposure to English) through subject-teaching (often resulting in the acquisition of "Indianisms" that may in fact be discouraged in the English class). Cf. also "sheltered language teaching" programmes (subject matter classes made comprehensible for the second language student, cf. Krashen 1985:71). A comprehensible-input and language-across-the-curriculum perspective might help bridge the gap between incomprehension and language learning.

2. English at the Initial level

i. Build familiarity with the language: a pre-literacy curriculum

Regardless of the particular class that English is introduced in (Class I-III or IV, or V/VI), **the aim at initial levels (the first, or first two years of English) is to**

- **build familiarity with the language (through primarily spoken or spoken-and-written input) in meaningful situations**, so that the child builds up a working knowledge of the language.

"There is at least one characteristic that is common to every *successful* language-learning experience we have ever known, and that is that the learner is exposed one way or another to an adequate amount of the data of the language to be learned" (Rutherford 1987:18).

- The reference to "adequate data" suggests that a single textbook presented over a year is inadequate. **The emphasis should shift from mastery learning of this limited input to regular exposure to a variety of meaningful language inputs.**
- This has implications for evaluation, to be discussed below.

Currently, the emphasis is on early literacy and mastery of answers to prescribed texts. We stress the need for a **pre-literacy curriculum**.

We begin with suggestions for providing "comprehensible input." ***Inputs*** include textbooks, other print materials such as Big Books, Class Libraries, parallel materials in more than one language, and media support (learner magazines, newspaper columns, radio/ audio cassettes, ...) and the use of "authentic" or available materials. Research suggests the existence of a "silent period" of about three months in natural second language learning situations, before the learner attempts to produce any language. The input the learner receives during this period serves as a base for attempts at early production (which may be limited to a few words, fragments of sentences, and formulaic language). **Thus the classroom must not insist on early production at the expense of exposure to and understanding of language, checked through the mother tongue, gestures, or single-word answers.**

- One route to early modified production in the classroom could be through "pseudo-production" of comprehended input: such as the learning of rhymes and poems, of language routines and formulae for classroom management, greetings, requests, etc. The need for pseudo-production perhaps motivates the current rote-learning approach. By recognizing and giving it its legitimate place in the curriculum, true production might be later attempted.[9]
- Drama and the enacting of plays is a traditional route to such pseudo-production in authentic, comprehended contexts. Beginning with action rhymes, simple plays or skits, theatre as a genuine class activity can promote the child's engagement

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[9] By pseudo-production we mean language behavior that mimics real production, but is not supported by an underlying system that allows the learner to step outside the boundaries of what has been taught.

with language and its performance. At later stages, this can develop into the study of rhetoric (along with grammar, see below).

ii. Complementing and supplementing teacher inputs

A limiting factor for providing sustained classroom discourse for comprehensible input is the teacher's own limited language proficiency (cf. Krishnan & Pandit (2003) for a dismal picture of the preparedness of teachers of English at class I.) However,

- **there are ways to complement as well as to develop teacher competencies through input.**

(i) Projects such as Interactive Radio Instruction (CLR, Pune)[10] suggest that local radio can deliver simple spoken language in comprehensible and interesting contexts that leads both to language acquisition by the child, and to improvement in teacher proficiency, beginning as late as at Class V in rural "English as foreign language" contexts. Regular, sustained exposure needs to be ensured, along with continuous feedback about comprehensibility.

(ii) Story-reading (as opposed to teaching stories as texts) can be developed into a classroom methodology within a Whole Language perspective (Jangid 2005).[11] Reading stories out aloud, Repeated reading, Choral reading, Story Re-telling and Rewriting activities can draw on and build on teachers' existing language proficiency and skills. Regular story reading triggers the acquisition process in children, and will encourage reading in the teacher as well as the pupil. Important methods to explore are

1. Shared reading of Big Books: large sized high-interest books with text and illustrations, used for group reading (cf. the books from Spark India and The Promise Foundation, Bangalore). As the teacher reads, pupils become familiar first with the story in spoken (read-out) language, and the illustrations; gradually an acquaintance develops with the print code. (This replicates in disadvantaged situations the reading out of stories to children in middle and upper class families, a "preliteracy" activity shown to promote the development of literacy.)
2. the use of Reading Cards (e.g., the English 400 and English 100 cards developed by CIEFL) and the provision of Class Libraries. The Reading Cards' short graded passages (beginning with 4-sentence stories) allow individual learners to choose their level of difficulty, and progress at their own pace in silent reading (hallmarks of those who develop "the reading habit"), after some initiation by the teacher.

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[10] The Centre For Learning Resources (CLR), Pune, has developed a 3-year Interactive Radio programme, 'We Learn English', for teaching spoken English in rural and urban regional medium elementary schools. Students were expected to respond in English during and after each of the 250 radio lessons of 15 minutes duration spread over 3 academic calendar years. Consequently, the cumulative impact on the speaking and listening skills of student listeners was spectacular. The Marathi-English version of this programme was broadcast by All India Radio in Pune District and Mumbai, while the Hindi-English version has been aired in Delhi, Jharkhand and Uttaranchal. Lakhs of school students, and other young and old listeners interested in learning English, have benefited from this programme

[11] Jangid (2005) reports on gains in reading, speaking and writing resulting from a year-long regular programme of story-reading. The work contains detailed discussion of a methodology for reading and associated teacher-led activity, along with pedagogical justification for each; and documents a variety of tasks for on-going or formative evaluation of language, in Class I.

3. "Talking Books" (cassette plus book) model speech as well as reading for the teacher as well as the learner. (CIEFL has some experience in this regard.) This is an area where the nascent market discourages quality private or capitalist initiatives; state support is necessary.

(iii) Prabhu (1987) describes a "task-based" methodology that leads to the "negotiation of meaning" and "meaning-focused activity" in the classroom.[12] The "text" for language learning here is teacher-talk: the teacher speaks in the classroom "in more or less the same way as an adult (speaks) to a child" (op. cit.:57). While this requires basic linguistic competence in the teacher, note that it does not require a specialist knowledge of grammar or literature. (As for the kind of English the teacher may speak, cf. section IV.2 below, and Prabhu (op. cit.:98ff.)

Such approaches and methods need not be exclusive but may be mutually supportive within a broad cognitive philosophy (incorporating Vygotskian, Chomskyan and Piagetian principles). E.g., language growth might be seen to require comprehensible *output* as well as comprehensible *input*; learners' grammar construction, claimed to be fundamentally implicit, may draw on an explicit route where appropriate or necessary; and reading instruction might include a phonic or a modified phonic approach along with a whole-word approach (as we suggest below). The concept of a child's *readiness* for particular activities (e.g. reading) must guide classroom implementation of syllabus objectives. The classroom, unlike the laboratory, needs to be an inclusive space, sensitive to individual learning styles.

iii. Using existing cognitive and linguistic resources.

An important insight emerging from task-based methodology is that we can, and must, create in the classroom "a need to communicate which brings into play not just target-language resources, but *all the other resources learners have at their disposal* (emphasis ours), for example conjecture, gesture, knowledge of conventions, numeracy, and the mother tongue" (Prabhu 1987:29). Learners in class I or class IV may be babies in the language, but cognitively they are children, not toddlers. Failing to use their (and their teachers') existing cognitive and linguistic abilities deprives us of a resource, and alienates the learner, who fails to make a connection between the new language and her mental world. This is the consideration behind our recommendation for cutting across the barriers between languages, and between content subjects and languages.[13]

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[12] The "Bangalore-Madras Project" or the Communicational Teaching Project was an important initiative combining theoretical rigor and conceptual clarity with a commitment to evolving a classroom methodology suited to local conditions. Located over a five-year period in eight classes of seven regional-medium schools (including three Corporation or Government schools) in Karnataka and Tamil Nadu, its aim was to provide learners with "deployable" language that conforms automatically to norms of implicit grammaticality. As the methodology evolved out of classroom practice, teaching passed from the hands of "specialists" to regular classroom teachers. The team sought to create in the classroom "conditions in which learners engage in an effort to cope with communication," i.e. "understanding, arriving at, or conveying meaning;" the format of a "task" based on a reasoning-gap activity satisfied teachers' and learners' "sense of plausibility" of what constituted a serious learning activity (as opposed to language games or role-play); and allowed for meaning-focused classroom activity and the negotiation of meaning within a clear overall direction. A full list of tasks is given in Prabhu (1987).

[13] Prabhu tells us (loc. cit.): "...task-based teaching of beginners did not throw up any major problems ... One small advantage was the existence of several English loan-words in everyday use in Indian languages, and in the school 'dialects,' some of which were therefore available even in the first lesson for beginners." (English began in class III in Tamilnadu, and class V in Karnataka, at the time of the project.)

iv. Beginning literacy

Decoding: Bottom-up and Top-down Oracy along with print is one important route to literacy. A holistic or top-down approach (through story-reading), that promotes visual recognition of whole words or chunks of language must be complemented by bottom-up approaches to letter-sound mapping and print decoding (these skills are presently equated with reading). A modified phonic approach via rhyming letter chunks (cf. Goswami 1999) significantly reduces the arbitrariness of English spelling (cf. the consistency of the 'a' sound in word-groups like *cat, rat, mat; car, far, star; ball, hall, call*; or the predictability of the vowel sounds in the letter sequences *it/ite, at/ate, ot/ote*). The famous Shavian example (*ghoti=fish*) arises because of the decontextualization of letter-groups from their syllabic space in the word (initial gh in English is never pronounced /f/, and the spelling ti is pronounced "sh" only in the sequence –tion). Adams (1990) is a good introduction to these issues. Pre-literacy oral activities can develop the child's ability to relate spoken and written language codes through rhymes, commonalities of first-sounds in names or words, etc.[14]

A print-rich environment A variety of pre-literacy activities can be undertaken in a *print-rich* environment: the classroom must display signs, charts, notices that organize its work, even as a middle-class home does (thus giving its child an edge over the first-generation learner), for recognition "iconically," as semiotic signs. The teacher can draw attention to "environmental print" where available (notices, signboards, labels): each class and each pupil can collect their own examples. Prabhu (1987) mentions beginner literacy-promoting communicational tasks in classes III to V that include labeling diagrams systematically with letters of the alphabet. Jangid (2005) shows that exposure to print though stories (Class I, or III) leads to a child's conceptualization of the page space in terms of centered headings, paragraphs and regular horizontal lines, contrasting with earlier chaotic writing.

Dictation is also now seen as a whole-language activity that requires the child to decode and hold in the mind chunks of text that must be reformulated for writing (Davis et al 2005).

v. Systems for support and delivery of comprehensible input

We have described in some detail activities and materials that promote language growth in the early years, because in the absence of these, the early introduction of English will fail to achieve its purpose. This section, in conjunction with those on multilingualism, teacher preparation and evaluation, provides a basis for affirmative action interventions in schools where neither teacher proficiency nor the environment are sufficiently supportive for English acquisition. The aim should be to identify delivery systems for comprehensible input to the child, whether in the classroom or outside it: e.g., the school can serve as a community resource center after school hours, for children. The current emphasis on "remediation" should yield to such supportive interventions as will ensure a baseline of success: when the majority of children appear to require "remediation," it is clearly the system itself that requires it. Currently teachers and schools tend to complain about the home background of the child not being sufficiently supportive; the onus should be on the system to provide the requisite support to disadvantaged learners.

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[14] Learner - generated English words brought in from the child's home. neighbourhood and the media become a resource for the entire class Nag-Arulmani et al (2003) show that for Std. 3 children struggling with English. exposure to a variety of sound games can promote children's reading. spelling and vocabulary development.).

3. ENGLISH AT LATER LEVELS: HIGHER ORDER SKILLS

i. Vocabulary, reading and literature

Lexical knowledge is now acknowledged to be central to communicative competence and the acquisition and development of a second language. Even in a first language, "... whereas the grammar of a language is largely in place by the time a child is 10 years old ..., vocabulary continues to be learned throughout one's lifetime" (Schmitt 2000:4).

The foundation for vocabulary development and writing at later levels is through reading extensively with comprehension and interest.

The debate on "instructed" and "incidental" vocabulary acquisition suggests that the very large vocabulary[15] required of a high-school student for academic purposes is not acquired in all-or-none, "taught" manner, but built up gradually and incrementally through reading (cf. Krashen 1989, Schmitt 2000). When language is adequately taught in the early years, the learner can naturally build up these higher-order skills independently, with some guidance from the classroom. Research has also shown us that greater gains accrue when language instruction moves away from the traditional approach of learning definitions of words (the dictionary approach) to an enriched approach which encourages associations with other words and contexts (the encyclopedia approach) (Fawcett and Nicolson, 1991; Snow et al, 1991).

Materials used or available as texts in class libraries may be in print as well as multi-media formats. Children must be exposed to a whole range of genres. As at all levels, but particularly at this level, the materials need to be sensitive to perspectives of equity (gender and societal) and harmony (between humans, and between humans and nature), given that a quantum of independent reading is expected (at least half-a-dozen pieces in an year). Sensitization to language as a vehicle of gendering can also be initiated for those groups where teacher and student competencies permit this; this is an ideal area for an across-the-curriculum exploration of language use.

Traditionally, language-learning materials beyond the initial stages have been sourced from literature: prose, fiction and poetry. While there is a trend for inclusion of a wider range of more contemporary and authentic texts (due both to a functional orientation of the language curriculum, and a broader definition of what constitutes literature), accessible and culturally appropriate pieces of literature continue to play a pivotal role; most children think of the English class as a place to read stories in. The use of language to develop the imagination is a major aim of later language study. Provision may in addition be made in the curriculum for the optional study of literatures in English: British, American, and literatures in translation: Indian, Commonwealth, European, and so on. Simultaneously, an English for Specific Purposes approach can be adopted where necessary and feasible. (Formulaic uses of language, such as in tourists' phrase books, do not presuppose any systematic or spontaneous knowledge of the language, and are excluded from our purview.) These approaches will serve as precursors of specializations to follow, at the undergraduate level, in the study of language.

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[15] A 20 year old university student receiving instruction through English is estimated to have or require a knowledge of 20,000 "word families" (a word along with its inflected and derived forms). Assuming acquisition of 1000 word families a year, a 17 year old school-leaving student should know between 15,000 and 17,000 word families, to be prepared for university education.

ii. Language and Critical Thinking: Reference skills, Grammar and Rhetoric

Pupils' introduction to writing at later stages could be through such authentic tasks as letter writing for people in their locality who need a scribe; and letter-writing to other children (we may think of inter-school programmes to promote this activity) or to others in society who volunteer to correspond with the child. Emphasis must be laid on study skills: note-making, note-taking, and reference skills; and spoken and written communication skills: public speaking, interviewing and debating, rather than on essays on well-worn topics. Exposure may be attempted to well-known speeches, and the structure of arguments (whether logical or emotional) may be analyzed.

Grammar can be introduced after basic linguistic competence is acquired, as a means of reflecting on academic language, and an intellectually interesting activity in its own right. Some grammar is in any case necessary for the ability to meaningfully make use of dictionary entries, as learner-dictionaries now incorporate a fair amount of "grammar" and usage as notes and in their coding. Grammar is not a route for developing primary or usable knowledge of language;[16] but it can serve as a tool for increasing the language repertoire, and for understanding the construction of text "rhetoric" and argumentation.

There is a persisting teacher concern that grammar is necessary for "accuracy" (as against "fluency") in language. This presupposes that the learner has had enough exposure to the language to produce it with sufficient systematicity to allow the identification of recurrent errors.

4. MULTILINGUALISM IN THE ENGLISH CLASS OR SCHOOL

i. The regional language context

At present the mother tongue enters the English class as a surreptitious intruder; teachers may "concurrently translate" and "explain" texts before dictating answers. It can be given its due place by being used for discussion and understanding, along with an engagement with English. One illustration of this is in Prabhu (1987): the limits on the use of the mother tongue in the Bangalore Project were naturally set by the requirements of the task, which was input in English, and required responses in English; the mother tongue made the language comprehensible where necessary. Given a variety of inputs in English, and a genuine attempt to understand them, the mother tongue need not be an interloper but a resource. Krashen (1985:94) points out that "(w)hile concurrent translation is not effective," the use of two languages in classroom can be "done in such a way as to provide comprehensible input in the target language, using the first language to provide background information."

An understanding of what constitutes legitimate use of the mother tongue needs to be arrived at by teachers' involvement in the framing of vehicles for English teaching. There is a need to address teacher mindsets on what levels of language mixing are legitimate. Some possibilities are:

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[16] The term grammar seems to be understood in a variety of ways. We do not rule out the possibility of encouraging "parsing" skills or strategies (identifying sense groups to see how they fit into the sentence, or inserting sense groups to expand a sentence) as a means of making input more comprehensible at earlier stages, especially in English-minimal environments. Some grammar (such as the appropriate use of prepositions) may more appropriately be termed the learning of vocabulary (including now under this term idiomatic or fixed expressions, e.g. in time and on time).

(i) **Removing the barriers between languages, and between "languages" and "subjects" in the primary school.** At the lower primary stage or at least in classes I-III, English can occur in tandem with the first language(s) for learning activities designed to create awareness of the world around the child (Das 2005). Materials need to be designed to promote such multilingual activity, and clear methodological guidelines need to be worked out in cooperation with teachers to see how more than one language can be naturally used. Linguistic purism whether of English or the Indian languages must yield to a tolerance of code-switching and code-mixing if necessary.

(ii) Introducing parallel texts in more than one language. These may be the same story, for example, NBT has published stories written in English as well as in the Indian languages (cf. Amritavalli and Rameshwar Rao 2001). The Promise Foundation has Big Books in four Indian languages and English; CFL has bilingual books using a Whole Language approach.

Such parallel texts may not be precise translations of one another but convey the same or similar meaning, or involve similar language activity: such as rhymes, sound games, etc., that sensitise the child to language-sound structures.

Reading is a *transferable* skill: improvement in reading in one language results in reading improvement in general (West 1914), not just for languages sharing the same scripts, but also in bi-scriptal situations (West worked with Bangla and English; little more is now known about bi-scriptal situations and the transferability of reading skills).

(iii) Using the known language for *reconstruction* of the meaning of attempted expression through imperfect English, in consultation with the learner (cf. Dr. Champa Tickoo's presentation to the Focus Group).

(iv) While the suggestions above see the languages working in tandem or in parallel, there is also experimental work available on bilingual or mixed-code texts for teaching reading (cf. Dowerah 2005, Felix 1998); their pedagogic potential can be explored.

(v) The production of **Bilingual learners' dictionaries** at various levels must be undertaken as a State initiative, as the fragmented market here discourages quality capitalist initiatives. Such dictionaries, readily available in (e.g.) English/ French/ Spanish/ Italian/ Japanese contexts, will encourage biliteracy and bilingualism besides promoting comprehens- ibility of input and independent reading.

(vi) Yet another bilingual educational model is to have inputs in a foreign language with production in a familiar language, sometimes reflected in a demand by (English medium) University students for writing their answers in their own language (some Universities allow this). (We note that the teaching of French (literary) texts in British high schools is accompanied by answers in English.)

While not all of these suggestions may be immediately workable, they suggest the availability of a number of alternatives for various contexts. These are not attempts to "dilute" the English curriculum but to integrate ground realities and needs with choices for delivery systems for English (cf. also the section on the textbook, below.)

ii. The English medium context

A serious challenge is to provide the urban elite child with a usable language other than English. A current model is the teaching of some subjects (such as the social sciences) in a non-English language (for some discussion, see Amritavalli 2001). Within the English class, texts from Indian writing in English (both fiction and non-fiction) are now found, as well as translations from Indian languages.

But the interaction between English and the other Indian languages needs to progress beyond this. Ways need to be explored to read parallel texts in their original language and English translation, for example. More fundamentally, teachers of English and other Indian languages need to agree on what constitutes academic language activity, and how this can be integrated into everyday life. Newspapers and magazines are now available that run parallel language editions (indeed, children's magazines such as *Chandamama* and *Amar Chitra Katha* have had a history of publishing in the Indian languages along with English); television channels have parallel language channels; there is available a pool of professionals who function in more than one language. These resources must be allowed to enter the classroom at the Primary and especially at the Secondary levels.

5. *TEXTBOOKS*

All this implies much more teacher-and learner-control over the texts used in class, *including textbooks. Curricular freedom cannot exist in the presence of a single prescribed text*. Earlier practices of choosing from a *range* of available texts can be revived; some states like Orissa have come up with innovative textbooks with short units that can be "covered" within a single class (Sunwani, 2005), incorporating the idea of a reading card. Language should be seen as a "dynamic" text, i.e. exposure should be to new occurrences of comparable language samples everyday, rather than repeatedly to a single text that is mastered (Amritavalli 1999 makes an analogy with the learning of a raga in Indian classical music). This will prepare the child for tests of "unseen" comprehension passages. Teachers and learners need to evolve for themselves a balance in the use of predictable and unpredictable texts that suits their level of comfort.

i. Learner-chosen texts

Preliminary research exists on the use of learner-chosen texts (Kumaradas 1993), i.e. articles, books, or shorter items such as paragraphs, jokes, or cartoons that learners bring to class to share. Stimulating leaner-search for suitable material encourages reading and extensive reading. It also opens up the class to "authentic" material, a resource neglected by the system; the ELT literature has wide-ranging discussions of the use of such material. One teacher writes about how trips to the post office and the railway station allowed the children to collect samples of English "texts." With older learners, radio, print or TV news or news features can be used (as CIEFL research suggests).

A "problem" is the existence of "guides" to prescribed texts. Instead of merely condemning the practice, we might ask why guides exist: they bridge the gap between local competencies (teacher/learner) and centralized systemic expectations (examinations/prescribed texts). A useful distinction can be made between "simplified" texts and "simple" texts: compare, for example, an article on butterflies in a science text, with a newspaper science column or an adult encyclopedia entry on this topic, and again with an article on butterflies in a children's book of knowledge: all these differ not merely in language but in information structure. **The information structure of textbooks that require guides needs to be examined.**

Space should be provided for more creative textbooks to emerge. There is a dearth of books written imaginatively in simple English for older learners. There does exist a range of creative literature in India for children in the private as well as public sectors, but much of it does not find entry into the classroom, for a variety of reasons.

6. TEACHER PREPARATION: TEACHER TRAINING AND DEVELOPMENT

Teacher Education needs to be on-going and on-site (through formal or informal support systems) as well as preparatory. Emphasis must be laid on teacher proficiency in or familiarity with the language, as the teacher is often a role-model (e.g., for reading). This is also one way to cultivate teacher awareness of or sensitivity to language learning. Proficiency and professional awareness are equally to be promoted, the latter to be imparted, where necessary, through the teachers' own languages.

A curriculum is only as effective as its implementation. The 1960s structural curriculum aimed at "teacher-proof" material; this model failed linguistically, pedagogically and psychologically. Subsequent presumptions of the teacher as "facilitator" of learning similarly face problems of credibility. While the teacher need not be the sole purveyor of language input (as recognized, e.g., by his/her dependence on a textbook), the success of any classroom activity or innovation stems from the teacher's resources in the language.

1) Teacher proficiency in English is linked to the teachers' sense of satisfaction, indeed to willingness to teach English (Krishnan and Pandit 2003). This factor has not been addressed in teacher training programmes hitherto. The recommendation for a later start for English presumed the availability of better (language-proficient) teachers at later stages (which however may not be true). With English now having been extended to situations where the teacher and the classroom are the sole sources of input, teacher proficiency has to be urgently addressed.
2) When proficiency is given its due place, there is freedom to provide the ideational or development component of teacher preparation in the teachers' own language, ensuring comprehension as well as debate. Teacher-training through English has often found the language of its academic content an obstacle to understanding; this leads to jargonization of teaching methodology. The Assam experience (Dowerah 2005) shows that academic content can be delivered in the teacher's own language.

   School teachers must mandatorily receive both pre-service training, and in-service education at regular intervals; systemic provision must be made to spare teachers from constant routine activity. Pre-service education could profit by updating its curricula (and training personnel) to reflect the cognitive revolution in learning; too often "lesson planning" is still done in terms of immediate behavioural objectives, in spite of the accumulated evidence for language and vocabulary "growth" as against conscious knowledge of content, rules or definitions.
3) On-site intervention is essential if workable ideas are to be identified and put into practice. The current gulf between "theory" (or academic posturing) and "practice" (or routinised survival), and theoreticians and practitioners, is a reflection of the gulf in their physical workspaces. Teachers can form self-help groups if "trainers" are not available in sufficient numbers, and supported with reading and media material. This will encourage grassroots innovation.

There is a need for reflective teachers who have a deep understanding of language learning and the English-multilingual classroom. The current pre- and in-service curriculum must be restructured to this end. Two key areas that must be incorporated in teacher education programmes are an understanding of the psychology of learning, and current knowledge about the processes of language and literacy acquisition, including topics such as have been mentioned in this document.

7. EVALUATION

The examination is universally felt to be the single obstacle to curriculum reform. How can evaluation be made an enabling factor for learning rather than an impediment? ***Language Evaluation*** need not be limited to "achievement" with respect to particular syllabi, but must be reoriented to measurement of *language proficiency*. We discuss some ways of conducting ongoing evaluation of language proficiency.

i. Ongoing continuous evaluation

Recommendations for on-going, continuous, or formative evaluation contrast with ground realities and problems reported by teachers, suggesting that ongoing evaluation can become meaningful only when teachers and learners take responsibility for their own progress, rather than performing to external benchmarks (real or imaginary, immediate or ultimate). Teachers and learners must be able to recognize the "occurrence of learning", a mental growth as imperceptible as physical growth.

Imagine the absurdity of a nutritional programme (excluding crash diets or miracle growth foods) that requires students' heights and weights to be measured at daily, weekly or even monthly intervals. Yet continuous evaluation seems to work on the ground in precisely such an unintuitive way. This malaise cannot be cured except through a deep understanding of the learning process, which is individual and self-regulatory. This deeper understanding is essential for teachers to then be able to perceive (and appreciate) subtle changes in children's language learning and proficiency. Perhaps all evaluation should ultimately aim at self-evaluation (a term fashionable in distance education, where its absence is deplored), if learners are to be able to exercise choices for learning, and become "lifelong learners." A teacher who knows his pupils is then primarily a sympathetic facilitator of the learner's self-evaluation (in contrast to an anonymous evaluator, who measures achievement with respect to standardized benchmarks).

It is how one evaluates that will decide whether a child will want to be evaluated. While even the most child-centered methods of evaluation will be anxiety provoking for some, there is no question that a system of evaluation must be put in place. It is thus a question of both ***how*** and ***how much***. Learners participate in evaluations with more comfort when the experience is not always a failure and the outcomes can be seen as a legitimate and appropriate way toward the next step in learning. Unfortunately for most children the immediate role played by current evaluation methods within the *learning* process is not clear. Continuous evaluation has to facilitate and guide teaching: by determining the learner's current stage of development or attainment, in order to identify her "zone of proximal development" (cf. Krashen's requirement that input should be at the *i+1* stage if the learner's language is at the *i* stage).

Learning attainments are results of language opportunities. Below we list a few pointers to such attainment.

SPEAKING

Beginning to speak

1) In mother tongue(s) learning, speech progresses form a one-word, mostly nouns, stage to the production of multi-word sentences with verbs, auxiliaries, determiners, adjectives and prepositions, perhaps through a two-word stage. Some research at CIEFL (Jangid 2005, Vijaya (in progress) suggests that second-language learner-speech progresses through similar stages. Typically, learner control of language is reflected in longer mean length of utterance; sustained language input is reflected in such a growth in output (in response, e.g.; to pictures shown to the child). In contrast, children from rigidly taught classrooms remain inarticulate, or produce single words, mostly nouns, in response to such pictures. Thus teachers can get an intrinsic sense of language growth in the child with such a task, administered at 3 or 4 month intervals.
2) The results for such an evaluation can be
   (a) in the form of an entry (a comment) in a portfolio that is maintained for each child ("portfolio assessment"); OR
   (b) recorded in teacher and/or learner diaries. Teachers' diaries as a source for teacher-development are being widely discussed. Learners can also be encouraged to maintain private, frank diaries of their learning experiences, in a language they know, to monitor their own progress.

Speaking: Subskills At later stages, speaking can be analyzed into subskills for testing.

Reading

Self-monitoring for comprehension and difficulty level Reading Programmes such as *English 400* have a built-in assessment with cards arranged in graded levels of difficulty, for monitoring progress. They need standardization for evaluation.

Reading: Some subskills

a) Reading Aloud/Decoding
   As children become more proficient in decoding, they read faster (words per minute) with fewer mistakes. There may be children who progress from mere spelling out of the letters of a word, to spelling and sounding out the word, using spelling out as a word attack skill for new words.
b) Scanning a text (such as list, a telephone directory, an advertisement) for information
c) Reading for given information (factual comprehension)
d) Reading for inference
e) Extended reading

The testing of writing and listening can similarly be broken up into subskills. This sort of testing can be complemented by integrated language tests (beginning with the Cloze test, for example). A subskills approach to evaluation reflects teachers' intuitions that particular students may have particular strengths; extrovert, articulate speakers may not be very interested in or good at an introverted, private activity like reading. The teacher can identify areas of strength as well as areas where help is needed.

ii. Summative Evaluation

- Must be "proficiency" rather than "achievement" oriented, i.e. not test the mastery of studied passages but the ability to use the language appropriately in new (albeit recurring) contexts, in
    - Reading age-appropriate material
    - Listening to and understanding age-appropriate material
    - Conversing on age-appropriate topics
    - Writing on age-appropriate topics
    - Control over receptive vocabulary
    - Control over expressive vocabulary

National benchmarks for language proficiency need to be evolved by first gathering reliable descriptive data in all these respects, from representative all-India samples. Such benchmarking of national norms or averages is well known as a precursor to the adoption of support initiatives where necessary, in the social sciences and education. It will also balance the curricular freedom we suggest be provided during the learning process, with the standardization of evaluation that certification ultimately requires.

The benchmarking should lead to a set of National English Language Tests, a bank of tests that learners and teachers can use for self-evaluation, by opting to take them. These tests should allow for a much finer measure of proficiency than a broad overall grade or score (currently, scores on unseen comprehension are conflated with scores on recall of passages already studied, thus bundling even "proficiency" with "achievement"!). It is a robust teacher intuition that not all learners are equally at home in all the four skills: thus good speakers may not be good writers, as there may be a trade-off between "accuracy" and "fluency" in the learning process. Neither are all skills equally important for all professions. Scores that reflect differential learner aptitudes and strengths will enhance employment potential, and have a washback effect on the curriculum.

Importantly, a set of National English Language Tests will also serve to counter the current problem of English (along with mathematics) being a principal reason for failure at class X. If an alternative route for English certification (and therefore instruction) can be provided outside the regular school curriculum, a student may be allowed to "pass without English" at class X.

In sum, **standardized national benchmarks** for language skills that culminate in a set of National English Language Tests for various levels will

1) Allow individual schools or students to get a sense of where they stand – their strengths and weaknesses, and how to progress
2) Balance freedom of learning (curriculum, time frame) with standardization of assessment
3) De-link failure *in English* at Class X from failure at Class X, and provide an alternative route for English certification outside the regular school curriculum.

IV. TWO SUPPLEMENTARY NOTES

1. The Critical Period or Sensitive Window Hypothesis

There is much ongoing debate over whether the mind's "language acquisition device" is available in *adult* second language acquisition; a standard journal in the field is *Second Language Research*, founded in 1985. A classic study suggesting a correlation between a grammatical principle called Subjacency, and age of second language acquisition, is Johnson and Newport (1989).

As for language acquisition in children, Lenneberg (1967) presented a biological argument for a critical period, extending from age 2 till 12, or puberty. The Lenneberg hypothesis was about the need for activation of biologically given physical or mental structures within a time frame (that is now referred to as a "sensitive window"); it made limited claims about *adult* second language acquisition, centering its discussion on recovery from (mother tongue) language loss by relateralization, or neural plasticity.

Krashen (1985) argues against Lenneberg, citing evidence that end of the critical period (the cut-off period for recovery from aphasia) may be as early as age 5; but (as most researchers agree) second-language acquisition with even a native-like pronounciation can be achieved by learners upto about 8 years of age (beyond that age, pronunciation tends to suffer). On the other hand, current research suggests that a "mother-tongue perceptual filter" is in place extremely early: thus babies can prosodically distinguish (in terms of stress and rhythm) *all* languages at birth, but by two *months* of age they distinguish only their own language-type from a different language type (e.g., English/ Dutch distinguished from French/ Spanish) (Mehler and Christophe 2000). (This helps babies to go on to determine the word-order (SVO/SOV) of their language.) Bilingual babies take a little longer to reach this stage of discrimination (under four months).

It is this evidence for a *range* of ages linked to *particular* language abilities in normal and non-normal language acquisition that prompts the change in terminology to *sensitive windows* (suggesting optimal periods for learning) from *critical periods* (suggesting cut-offs).

Researchers using brain-imaging to monitor brain activity in adults have found a link between proficiency level and area of representation, but no effect of age of acquisition (Perani et al 1998). This PET study tested Italians "who had learned English after the age of 10 and had attained excellent performance" (Mehler and Christophe 2000: 903). A study by Kim et al (1997) using fMRI during "silent speech" found overlap in Wernicke's (comprehension) area, but segregation in Broca's (production) area, of two languages, correlating with age of acquisition; but this study did not control for proficiency.

It is evident that the results of these studies are at best equivocal. Little Indian research is available in these areas. At any rate, beginning English as late as Class V (age 10+) would still fall within the Lenneberg "window." The issue is not so much the age at which English is begun but the exposure and facilities made available for learning this language; two to three years of good opportunities are preferable to a prolonged (upto 10 years, starting at Class 1) failure.[17]

There may be something to learn here from the successful teaching to foreign languages in India (French, German, ...) to adults. Moreover, the Indian experiences of

i) Daughters-in-law learning their in-laws' language
ii) Regional medium school products who go on to achieve native-like proficiency in English as academics and intellectuals
iii) All-India services personnel and their families' control of multilinguality needs to be chronicled, carefully evaluated and critically examined.

In the meanwhile, societal trends can only be stemmed by demonstrable alternative routes to success. We should aim to set up multilingual schools where no single language is privileged as "medium of instruction" but where languages are used as they are available, as conduits to resources.

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[17] See also the Report of the one-man committee on English in primary education in West Bengal, 1998, pp. 22-28.

2. WHICH ENGLISH?

In its primary spoken form, language is a continuum of social or geographical dialects that are mutually intelligible at adjacent locations, whereas locations separated geographically, socially or in time may become unintelligible. Most speakers command more than one spoken dialect or register of language (e.g. formal and informal varieties). Written varieties of language, after the invention of print, have tended towards a standard variety that serves as the norm, particularly in education and academic life; this is necessary given the relative permanence of such communication.

Discussions on what model of English is appropriate for India center mostly around the pronunciation (i.e. spoken English), and secondarily on lexis or vocabulary. The criterion for an acceptable pronunciation has to be intelligibility. David Crystal's ( ) concept of a tri-dialectal model, with speakers moving smoothly from a regional dialect (such as Punjabi English or Tamil English), to a national dialect (Indian English) or an international dialect where required, seems to be a feasible one. The success of young Indians at call centers shows that "accent training" is a matter of unlearning obvious regionalisms and arriving at a neutral speech style. This is achieved in large part by learning to slow down speech, speaking to a rhythm and articulating with clarity: factors that improve the sound of speech in any language.

As for the sounds themselves, spoken "Indian English" has been described as having some pan-Indian characteristics such as long vowels instead of diphthongs, and retroflex consonants instead of alveolar ones. Many more characteristics of "Indian English" reflect the various mother tongues of the speakers, given the fact that "India" is a nation, but "Indian" is not a language. The less obtrusive these mother-tongue characteristics are, the more acceptable the pronunciation of the other tongue. It is also a common experience that a person may have more than one speech style, just as he understands many accents other than his own.

Coming to lexis, linguistically the vocabulary of a language is an open class that enriches a language the more it borrows. It is well known that the strength of the English vocabulary lies in the richness of its sources. Standard dictionaries currently have supplements of words commonly occurring in English used in India; there surely cannot now be any reason to keep these words out of the classroom. We include in lexis the idiomatic use of prepositions: *in a bus* rather than *on a bus*, and the use of *into* in mathematics; the latter means the division of one number by another in British English, but the multiplication of two numbers in India. Such usages need not be seen as non-standard grammar.

As for the rest, we expect a comprehensible-input rich curriculum to trigger the formation of a linguistic system in the mind that approximates to standard varieties; cf. Prabhu (1987) for more discussion.[18] It is obvious that we do not think that Indian English is an inferior variety; nor is the Indian teacher's English inferior, once proficiency – a basic grammatical competence in the language – is ensured. But a national curriculum must envisage comparability of inputs for all kinds of learners. Popular opinion has already forced the revision of a stance whereby English was available to only a privileged few at the onset of schooling, and to others only later. We would not now want some learners to learn "English" while others rest content with "Indian English." We see the attainment of a standard, internalized English competence as both practicable and desirable.

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[18] Such a system may have a few often observed "Indian" characteristics, which interfere not with intelligibility but with social acceptability. To the extent, e.g., that using too good to mean very good interferes with the intended meaning, it needs to be corrected. Failure to invert the auxiliary in questions, or unnecessary inversion of auxiliary in embedded questions (Why you said so? I wonder why did he say so) do not interfere with intelligibility, although they may be socially – and educationally – marked.

The question of the model of English to teach should (in any case) not loom so large in the teachers' minds as to prevent the acquisition of any English at all. Nor should simple lack of competence in English masquerade as "Indian English," pending a more systematic documentation of this variety. In a wider context, there is a great demand for teachers (and teacher educators) from India in the global market. This should give us greater confidence about our linguistic abilities in English. [19]

V. RESEARCH PROJECTS

The initiation of research projects grounded in an awareness of current thinking is necessary for the provision of baseline data in language education, for curricular innovations and their implementation, and for theoretical progress in understanding second language acquisition. A few suggestions for broad areas within which such projects may be conceptualized are made below.

I. Language across the curriculum: The language of social science and science textbooks (including verbal mathematics): patterns of questioning, and the relation of content to language
II. Language inputs and language growth: a holistic perspective
    i) Language in spoken form (with or without print support)
    ii) Language in written form (with or without read-aloud support)
    iii) Status of English at the primary level
    iv) A bank of activity and text materials (Level I)
III. Methods and materials to promote multilingualism
IV. Curricular choices for special groups (socially marginalized, learning-disabled)
V. Outcomes of teacher-training

VI. RECOMMENDATIONS

Recommendations

V. Outcomes of teacher-training
II. Teachers
    - All teachers who teach should have basic proficiency in English
    - All teachers should have the skills to teach English in ways appropriate o their situation and levels, based on their situation and levels, based on a knowledge of how languages are learnt

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[19] An interesting question is the relationship of Language Teaching to English Language Teaching, where the latter may be perceived as primarily a British industry. We have grounded our discussions in the broader field of Second Language Acquisition, perceiving our responsibility in this paper in pedagogic terms, and addressing ourselves to curriculum renewal in this nation through current insights in the psychology of learning, and the psychology of language. Thus many of our observations and recommendations (such as the discussion of a Cognitive Academic Linguistic Proficiency) pertain to language teaching (or language in education) in general.

Much current discussion in the English Language Teaching profession is based on the politics and ideology of English: English (and more broadly, Western) hegemony over the third world (cf. Canagarajah 2005). To an appreciable extent, concerns such as multilingualism and validation of local knowledge or choices have been incorporated into our recommendations. We do not see the need (thus) to enter further into the intellectual debate between the West and ourselves, particularly as we see the attainment of a standard, internalized English competence as both practicable and desirable.

These two recommendations have implications for the content of pre-service and in-service teacher education programmes.

III. Curriculum

- A variety of materials should be available to provide an input –rich curriculum which focuses on meaning.
- Multilinguality should be the aim in English-medium as well as regional-medium schools. Similarly, language across curriculum perspective should be adopted.

  This has implications for textbook design and choice of appropriate methods (class libraries and media support).

IV. Evaluation

- Evaluation to be made an enabling factor for learning rather than an impediment. Ongoing assessment should document a learner's progress through the portfolio mode. Language evaluation need not be tied to "achievement" with respect to particular syllabi, but must be reoriented to measurement of language proficiency.
- National benchmarks for language proficiency should be evolved as a preliminary to the preparation of a set of English language tests.

REFERENCES, SELECT BIBLIOGRAPHY AND RECOMMENDED READING

REFERENCES

Adams, Marilyn J. 1990. Beginning to read: thinking and learning about print. Cambridge, MA.: MIT Press.

Aitchison, Jean. 1988. Words In the Mind: An Introduction to the Mental Lexicon. Oxford: Oxford University Press.

Amritavalli, R. 1999. Language as a dynamic text: essays on language, cognition and communication. CIEFL Akshara series. Hyderabad: Allied Publishers.

Amritavalli, R. 2001. UNESCO. Applied research in Language Education. In C. J. Daswani (ed.) Language Education in Multilingual India. UNESCO. New Delhi.

Amritavalli, R. and Rameshwar Rao, Lakshmi. 2001. Coping with three languages in school: focus on multilingual reading. *The Hindu* educational supplement. March 13.

Canagarajah, S. 2005. Reclaiming the local in language policy and practice. Mahwah, N.J. Lawrence Erlbaum.

Chomsky, Noam. 1975. Reflections on Language. New York: Pantheon.

Crystal, David. The Language Revolution. Foundation Books.

Cummins, J. 1979. Linguistic interdependence and the educational development of bilingual children. Review of Educational Research 49:222-51.

Cummins, J. 1984. Bilingualism and special education: issues in assessment and pedagogy. Clevedon: Multilingual Matters.

Das, Bikram K. 2005. Focus on English. Ms., NFG-English.

Davis, Paul, Rinvolucri, Mario and Ur, Penny. 2005. Dictation: New Methods, New Possibilities. Cambridge: Cambridge University Press.

Dowerah, Sawpon. 2005. Eclecticism in Methodology. Ms., NFG-English.

Elley, Warwick and Mangubhai, Francis. 1983. The impact of reading on second language learning. Reading Research Quarterly 19, 53-67.

Fawcett, A. J., & Nicolson, R.I. (1991). Vocabulary training for children with dyslexia. *Journal of Learning Disabilities*, 24 (6), 379-383.

Felix, Paul. 1998. Learning to read English: The mixed code way. In Vivien Berry and Arthur McNeill (eds.) Policy and Practice in Language Education. Hong Kong: Department of Curriculum Studies, The University of Hong Kong.

Goswami, Usha. 1999. Phonological Development and Reading by Analogy: Epilinguistic and Metalinguistic Issues. In Jane Oakhill and Roger Beard (eds.) Reading Development and the Teaching of Reading: a psychological perspective. Oxford: Blackwell.

Graddol, David. 1997. The Future of English. London: British Council.

Khan, Nasiruddin. 2005. Introduction of English as a subject at the primary level. Ms., NFG-English.

Krashen, Stephen D. 1985. The Input Hypothesis. Essex: Longman.

Krashen, Stephen D. 1989. We acquire vocabulary and spelling by reading: Additional Evidence for the Input Hypothesis. The Modern Language Journal 73 iv: 440-464.

Krashen, Stephen D. and Terrell, Tracy. 1983. The Natural Approach: language acquisition in the classroom. Alemany Press: Hayward, CA.

Kumar, Geetha. 2005. Teaching English – a teacher's perspective. Ms., NFG-English.

Kumaradas, Shyamala. 1993. A case for learner-chosen texts as input in adult language learning. M.Phil thesis, CIEFL.

Kurrien, John. 2005. Notes for the Meeting of the National Focus Group on Teaching of English, & Note on Introduction of English at the Primary Stage. Mss., NFG-English.

Mathew, Rama. 1999.

Nag-Arulmani, S (2000). Types and Manifestations of Learning Difficulties in Indian Classrooms, paper presented at the first orientation programme for school teachers, National Institute for Public Co-operation and Child Development (NIPCCD), Bangalore, India.

Nag-Arulmani, S., Reddy, V., and Buckley, S.2003. Targeting Phonological representations can help in the early stages of reading in a non-dominant language Journal of Research in Reading, **26** (1), 49-68, Special Issue on the Development of Literacy among Bilingual and Multilingual Children, Blackwell Publishers, UK.

Nag-Arulmani, Sonali. 2005. Language Attainments and Learning Opportunities: pointers for a new curriculum framework. Ms., NFG-English.

Oakhill, Jane and Beard, Roger. 1999. Reading Development and the Teaching of Reading. Oxford: Blackwell.

Prabhu, N.S. 1987. Second Language Pedagogy. Oxford: Oxford University Press.

Rutherford, William E. 1987. Second Language Grammar: Learning and Teaching. Essex: Longman UK.

Report of the one-man committee on English in Primary Education, West Bengal, 1998: Chapter Five, '"The Earlier, The Better:" a noisy space.'

Sahoo, Sandhya. 2005. ELT: Materials and Methods that Work Ms., NFG-English.

Shamala, S. K. 2005. National Curriculum framework for School Education. Ms., NFG-English.

Saxena, R. P. 2005. Language and Culture. Ms., NFG-English.

Schmitt, Norbert, and McCarthy, Michael. 1997. Vocabulary: Description, Acquisition and Pedagogy. Cambridge: Cambridge University Press.

Schmitt, Norbert. 2000. Vocabulary in Language Teaching. Cambridge: Cambridge University Press.

Snow, C. E., Cancina, H., DeTemple, J., & Sehley, S. (1991). Giving formal definitions: a linguistic or metalinguistic skill. In E. Bialystok (E . Language processing in bilingual children (pp. 90 – 112). Cambridge UK: Cambridge University Press.

Snow, C. E., Burns, M. S., & Griffin, P. (1998). Committee on the prevention of reading difficulties in young children. National Research Council, Washington D.C.: National Academu Press.

Stanovich, K. E. (2000). Progress in Understanding Reading: Scientific Foundations and New Frontiers. New York: Guilford Press.

Suriwani, Vijay Kumar. 2005. The English Language and Indian Culture. Ms., NFG-English.

West, Michael. 1941. Learning to read a foreign language (Longmans).

Widdowson, H.G. 1978. Teaching Language as Communication. Oxford: Oxford University Press.

SELECT BIBLIOGRAPHY AND RECOMMENDED READING

The Whole Language approach / Reading

1. Eldridge, J. Lloyd ___ Chapter 1: Whole Language. From *Teaching Decoding in Holistic Classrooms* Merrill Englewood Cliff: New Jersey.
2. Elley, Warwick. and Mangubhai, Francis. 1981. The impact of a book flood in Fiji Primary School. *Studies in South Pacific Education*, 1, 1-30.
3. Elley, Warwick and Cutting, Brian. 2001. The "Sunshine in South Africa" literacy project. *International Journal of Educational* Research, 35, 193-203.
4. Elley, Warwick. 2000. The potential of book floods for raising literacy levels. *Internatinal Review of Education*, 46:3/4, 233-255.
5. Elley, Warwick. 2001. Conclusion: what have we learned? *International Journal of Educational* Research, 35, 237-246.
6. Elley, Warwick. 2001. Guest editor's introduction. *International Journal of Educational* Research, 35, 127-135.
7. George, P. T. 1977. Bridging the gap between school and college-report of a try-out of the stairway reading course. *CIEFL Bulletin*, 13:1, 37-49.
8. Hudelson, Sarah. ___ Literacy development of second language children. In Fred Genesee (ed.) *Educating Second Language Children*, Cambridge: Cambridge University Press.

Dictionaries / Reference Materials

1. Amritavalli, R. 1999. Dictionaries are unpredictable. *English Language Teaching Journal*. 53:4, 262-269.
2. Amritavalli, R., Jana, A.. and Vijaya. 2003. Student's understanding of dictionary entries: a study with respect to four learner's dictionaries. Indian *Journal of Applied Linguistics*, 29:1, 5-20.
3. Das, Bikram. 2004. *Word Master: Learner's dictionary of modern English.* Hyderabad: Orient Longman.

4. Fischer, Ute. 1994. Learning words from context and dictionaries: an experimental comparison. *Applied Psycholinguistics* 15:4 551-574.

Dyslexia

1. Frank, R. Vellutino. 1980. *Dyslexia: theory and research.* Mass.: MIT press.
2. Miles, T. R. 1995. Dyslexia: the current status of the term. II. *Child Language Teaching and Therapy,* 2:1, 23-33.
3. Thomson, M. E. and Watkins, E. J. 1993. *Dyslexia: a teaching handbook.* London: Whurr Publishers.

Input-rich methodologies

1. Krashen, Stephen. 1989. We acquire Vocabulary and spelling by reading: additional evidence for the input hypothesis. *Modern Language Journal,* 73:4, 440-464.
2. Newmark, Leonard. ___ How not to interfere with language learning. In ___ (ed.) *Methods that work.*
3. Macnamara, John. ___ Nurseries, streets, and classrooms: some comparisons and deductions. In ___ (ed.) *Methods that work*
4. Terrell, Tracy D. ___ The natural approach to language teaching: an update. In ___ (ed.) *Methods that work*
5. Krashen, Stephen. ___ The din in the head, input and the language acquisition device. In ___ (ed.) *Methods that work*
6. Amritavalli, R. 1995. Media and Language acquisition. In Agnihotri & Khanna eds. ELT in India. New Delhi: Sage. P. 181-186.
7. Prabhu, N. S. 1987. *Second Language Pedagogy*. Oxford: OUP.
8. Prabhu, N. S. 1998. Teaching is at most hoping for the best. RELC Seminar.

Authentic Materials

1. Strevens, Peter. 1987. Interaction outside the classroom: using the community. In Wilga Rivers, (ed.) *Interactive language teaching.*
2. Using authentic materials, audio/video. *CIEFL Ms.*
3. Maley, Alan. 1987. Poetry and song as effective language learning activities. In Wilga Rivers, (ed.) *Interactive language teaching.*

Classroom Materials

1. Big Books: (Hyderabad: Spark India.) *Under the bed.*
   A pot of light.
2. Rao, Lakshmi Rameshwar. 2005. *Spark Geography.* Hyderabad: Spark India.
3. Rao, Lakshmi Rameshwar. 2003. *Spark Junior Geography.* Hyderabad: Spark India.

Research Theses / Papers

1. Classroom transcription (Class VIII) by V. Varalakshmi.
2. PhD. Thesis by Gita Jangid.
3. MPhil Theses by Madhavi Gayathri Raman, Vijaya, and Lipipushpa Nayak.

Reference books:

A teacher's guide to the psychology of learning. MJA Howe Basil Blackwell 1984

Tickoo, M.L. 2004. *ELT in India* New Delhi: Orient Longman.

TEACHING OF SOCIAL SCIENCES

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EXECUTIVE SUMMARY

The social sciences encompass diverse concerns of society and include a wide a range of content, drawn from the disciplines of history, geography, political science, economics and sociology. The selection and organisation of material into a meaningful social science curriculum, enabling students to develop a critical understanding of society, is therefore a challenging task. The possibilities of including new dimensions and concerns are immense especially in view of the student's own life experiences.

It is important to reinstate the significance of the social sciences by not only highlighting its increasing relevance for a job in the rapidly expanding service sector, but by pointing to its indispensability in laying the foundations for an analytical and creative mindset.

It is often presumed that only natural and physical phenomena lend themselves to scientific inquiry, and that knowledge areas pertaining to the human sciences (history, geography, economics, political science etc.) cannot be, by their very nature "scientific". But it is necessary to recognise that the social sciences lend themselves to scientific inquiry just as much as the natural and physical sciences do, as well as to articulate the ways in which the methods employed by social science are distinct (but in no way inferior) to those of the natural and physical sciences.

The social sciences carry a normative responsibility to create and widen the popular base for human values, namely freedom, trust, mutual respect, respect for diversity, etc. Thus, social science teaching basically should be aimed at investing in a child a moral and mental energy so as to provide her with the ability to think independently and deal with the social forces that threaten these values, without losing her individuality. Social Science teaching can achieve this by promoting children's ability to take initiative to critically reflect on social issues that have a bearing on the creative coexistence between individual good and collective good. Critical reflection pre-supposes a comprehensive curriculum in which learners – both teachers and children – participate in generating knowledge without any latent and manifest forces of coercion. It is through this non-coercive and participatory mode that children and teachers stand the best chance of making teaching and learning interesting as well as enjoyable.

The disciplines that make up the social sciences, namely history, geography, political science and economics, have distinct methodologies that often justify the preservation of boundaries. The boundaries of disciplines need to be opened up and a plurality of approaches may be applied to understand a given phenomenon. For an enabling curriculum, certain themes that facilitate interdisciplinary thinking are required.

The Proposed Epistemological Frame

Based on certain considerations of dominant perceptions as well as issues to be addressed the following points serve as the foundational logic in the drafting of new syllabi:

- The curriculum must be able to show, how the nation and national unity figures in local perceptions of the people. Local perceptions, therefore, have to be articulated through reorienting curriculum

- The notion of textbook be changed from being merely instructive to more suggestive. It is argued that this would offer enough scope for the learner even to go beyond the very textbook, creating more appetite for further reading that is necessary to enrich the understanding of a given social phenomenon.
- The major thrust of the social science curriculum, has remained utilitarian in nature. That is to say, it puts more emphasis on developmental issues that are important but not sufficient to understand the normative dimension – issues of equality, justice and dignity of society polity. Teaching of social science, has thus been linked up to the role of an individual in contributing to this 'development'. In view of this gap, there is a need to achieve a shift in focus from utilitarianism to egalitarianism that would address the normative concerns as mentioned above.
- It is suggested to bring a change in nomenclature from civics to political science. Civics as a subject had appeared in the Indian school curriculum in the colonial period in the background of increasing 'disloyalty' among Indians towards the Raj. Emphasis on the obedience and loyalty of the citizens and creation of civil society according to the universal values of progress were the key features of the colonial civics. Whereas, political science suggests dynamism that involves the process that produces structure of dominations and their contestations by social forces. Political science imagines civil society as the sphere where more informed, receptive and responsible citizens could be produced.
- Gender concerns need to be addressed in terms of making the perspectives of women integral to the discussion of any historical event and contemporary concern. This shift from highlighting individuals to forefronting women's struggles both historically as well as on a daily basis, requires an epistemic shift from the patriarchal nationalist frame.

Planning the Curriculum

At the primary stage, the natural and social environment should be taught as an integral part of language and mathematics (with gender sensitivity). Children should be engaged in activities that would help them in promoting an understanding about the natural and social environment. Understanding at this level should be based on observation and illustration rather than abstractions. Illustrations need to be drawn from the physical, biological, social and cultural aspects of life. It is important for the child to develop the skill of observation, identification and classification.

For classes III to V, the subject Environment Studies will be introduced. A child may be initiated to locate and comprehend the relationships between the natural and social environment, and introduced to analogies between natural diversity and socio-cultural diversity. That is to say, social science teaching based on observation and experience can create cognitive capacity within the child. It is this aspect of social science teaching that is so frequently missing in our curriculum.

At the upper primary stage, the subject-area of Social Science drawing its content from history, geography, political science and economics will be introduced. Simultaneously, the child may be introduced to contemporary issues and problems. Contemporary issues may be looked at from multiple perspectives introducing the child to social and economic problems of society. Emphasis needs to be given to issues like poverty, illiteracy, child and bonded labour, class, caste, gender and environment. Geography and Economics may together help in developing a proper perspective related to the issue concerning environment, resources and development at different levels from local to global. Similarly, Indian history will be taught emphasizing the concepts of plurality and change. The child will be introduced to the formation and functioning of governments at the local, state and central level and the democratic processes of participation.

At the secondary stage, social sciences comprise elements of history, geography, political science and economics. The main focus will be on contemporary India and the learner will be initiated into a deeper understanding of the social and economic challenges facing the nation. In keeping with the epistemic shift proposed, contemporary India will be discussed from the perspectives of the adivasi, dalit and other disenfranchised populations and effort should be to relate the content much as possible to the children's everyday lives.

India's freedom struggle and the contributions of various sections/regions shall be studied. India's nationalist movement and its developments as an independent nation will be taught in the context of developments in the modern world. Issues relating to geography should be taught keeping in mind the need to inculcate in the child a critical appreciation for conservation and environmental concerns. In political science the focus should be on discussing the philosophical foundations that underlie the value framework of the Indian Constitution, i.e. an in-depth discussion of equality, liberty, justice, fraternity, dignity, plurality and freedom from exploitation. As the disciplinary area of economics is being introduced to the child at this level, it is important that the topics discussed are from the perspective of the masses. For example, poverty and unemployment may be derived from an understanding of the functioning of economic institutions and the inequalities sustained by economic relations.

TEACHING OF SOCIAL SCIENCES

1. BACKGROUND

The social sciences encompass diverse concerns of society and include a wide range of content drawn from the disciplines of history, geography, political science, economics, and sociology. The selection and organisation of material into a meaningful social science curriculum, one that will enable students to develop a critical understanding of society, is therefore a challenging task. The possibilities of including new dimensions and concerns are immense, especially in view of the students' own life experiences.

Various curricular frameworks have differed on the organisation of material in the social sciences. Although the 1975 document argued for "identifying essential units in each of the subjects and then unifying them into an integrated syllabus", the social sciences were taught as separate subjects, and the NCERT prepared three separate textbooks for history, geography, and civics for Classes VI–X (*The Curriculum for the Ten-Year School: A Framework*, 1975, p. 20). However, for examination purposes the three subjects were combined under one paper called social science. The 1988 curricular review introduced no major changes in the syllabus for the upper primary stage, although it did explicitly state, "Special care should, hence, be taken in designing the curriculum in [the] social sciences so as not to overlook any of the core components." (*National Curriculum for Elementary and Secondary Education: A Framework*, 1988, p. 27). At the secondary stage, however, it instituted four books, adding economics to the list of history, geography, and civics. *The National Curriculum Framework for School Education*, 2000 discussed the need for the social science curriculum to be comprehensive but not loaded with information. In addition, it detailed the need for ideas to be interrelated through the selection of particular themes or issues, stating, "These themes may be drawn from geography, history, civics, economics and sociology in a balanced manner and suitably graded simple to complex and immediate to remote." (*NCFSE*, 2000, p. 63). The current social science textbooks were arranged around themes establishing the interrelatedness among the subject areas wherever possible. Accordingly, one textbook for social science for each class (Classes VI–X) was prepared.

2. CONCEPTUALISING THE NATIONAL CURRICULUM FRAMEWORK, 2005

Members of the present review committee recognise the efforts made in the past to create an ideal social studies curriculum. However, we also find that a lot of work remains to be done to clarify this ideal. This clarification is of serious significance in today's neo-liberal India where the subjects that comprise the social sciences are considered superfluous and unnecessary for gaining employment. Members of the committee, therefore, felt the need to first discuss existing perceptions of the social sciences amongst the larger community, and then factor this into the curricular framework that we propose. To ensure that the curricular recommendations are adequately translated into textbooks, the committee has also highlighted the main issues to be addressed within this review in order to make the social sciences an intellectually and professionally valuable subject of study.

2.1 Prevailing Perceptions of the Social Sciences

2.1.1. The dominant view of social science is that it is a non-utility subject. As a result of this perception, a low self-esteem governs the classroom-transaction process, with both teachers and students feeling uninterested in comprehending its contents. From the initial stages of schooling, it is often suggested to students that the natural sciences are superior to the social sciences, and are the domain of 'bright' students. Therefore, there is a need to highlight the fact that the social sciences are essential to providing the social, cultural, and analytical skills required to adjust to an increasingly interdependent world, and to deal with the political and economic realities that govern its functioning.

2.1.2. There is a widespread belief that social science merely transmits information and is too centred on the text, which requires to be memorised for examinations. The content of these textbooks is considered to be unconnected to daily realities even though it is supposed to be constituted very much by the world in which we live. In addition to this, social science is viewed as providing unnecessary details about the past. It is also felt that the examination paper rewards the memorisation of these superfluous 'facts', with the children's conceptual understanding being largely ignored. Any effort to address the information overload in the social sciences will simultaneously have to review the current examination system.

2.1.3. The cultural superiority that the physical and natural sciences exercise also generates the perception that not many desirable job options are open to students specialising in the social sciences. In addition, it is felt that the social sciences are bereft of the 'skills' required to function in the real world. This produces the common-sense impression that the subject is redundant. It is important to reinstate the importance of the social sciences by not only highlighting their increasing relevance for jobs in the rapidly expanding service sector (as opposed to the manufacturing sector, which is slowly but surely shrinking), but also by pointing to their indispensability in laying the foundations of an analytical and creative mind.

2.2 Issues to be Addressed

2.2.1. *Content Load*: While translating curricular objectives into syllabi, members of this Focus Group wish to reiterate the point made by the Yashpal Committee, as well as by *NCFSE* 2000, that we should try and minimise the retention of information without comprehension. Given that the 'facts' that govern social reality are plentiful, and that syllabus framers and textbook writers need to choose from a lot of relevant information about what to include, the effort should not be to convey as many facts as possible. Instead, a focus on concepts and the ability to analyse socio-political realities will help reduce the existing conflation of facts with knowledge.

Plurality and Local Content: In a pluralist society like ours, it is important that all regions and social groups should be able to relate to the textbooks. This is often impossible given the centralised nature of textbook production. Therefore, it is necessary to work towards institutionalising an alternate, more decentralised mechanism of knowledge generation in which teachers, students, and the local community feel empowered to bring in their own realities to the teaching of social studies. Relevant local content should be part of the teaching-learning process, ideally transacted through activity-based methods drawing on local teaching-learning resources.

2.2.3. *Scientific Rigour*: It is often presumed that only natural and physical phenomena lend themselves to scientific inquiry, and that knowledge areas pertaining to the human sciences (history, geography, economics, political science, etc.) cannot be, by their very nature, 'scientific'. In view of the 'higher status' and legitimacy enjoyed by the natural sciences, some practitioners of the social sciences seek to imitate the physical and natural sciences in their methods. In light of the above, it is necessary to recognise that the social sciences lend themselves to scientific inquiry just as much as the natural and physical sciences do, as well as to articulate the ways in which the methods employed by the social sciences are distinct (but in no way inferior) to those of the natural and physical sciences.

2.2.4. *Normative Concerns*: The social sciences carry a normative responsibility to create and widen the popular base for human values, namely freedom, trust, mutual respect, respect for diversity, etc. Given this, social science teaching should aim at investing in children a critical moral and mental energy so as to immunise them from the social forces that threaten these human values. This should be done through retaining the child's individuality and her ability for independent thought. The 'indoctrination' usually associated with the social sciences needs to be substituted with a critical and continuously evolving comprehension of past and present social realities so that 'facts' begin to be understood not as the 'truth' but as always privileging a particular perspective. Through discussing concerns such as the environment, caste/class inequality, and state repression through an interdisciplinary approach, the textbook should stimulate the child's thought process and creativity instead of stymieing this through a regurgitation of the 'facts' associated with the denial and exercise of these human values.

2.2.5. *Interrelationship among Disciplines*: The disciplines that make up the social sciences, namely history, geography, political science, and economics, have distinct methodologies that often justify the preservation of boundaries. The boundaries of disciplines need to be opened up, and a plurality of approaches may be applied to understand a given phenomenon. For an enabling curriculum, certain themes that facilitate interdisciplinary thinking are required. These themes should be culturally relevant, and concepts should be introduced bearing in mind the age of the child. In the past, this idea of interdisciplinarity had been taken care of by introducing certain themes, but with each theme largely covering one disciplinary area. There is a need for themes to be selected based on whether different disciplinary approaches can help facilitate an in-depth and multiple understanding of the particular theme. However, it is possible that not all themes can be discussed in an interdisciplinary manner and that a careful selection of a few themes needs to be made, as well as separate chapters relating to different disciplines also need to be retained.

The interdisciplinary approach can be adopted to study one particular theme. For example, the institution of the 'mandi' can be used to study one particular theme, and this can also be used to make connections to various disciplines.

3.0 THE PROPOSED EPISTEMOLOGICAL FRAME

Based on the above considerations of dominant perceptions as well as the issues to be addressed in the writing of the social sciences, the committee proposes that the following four points serve as the foundational logic in the drafting of new syllabi based on this curricular revision.

3.1.1. The subject of national integration is often looked at in terms of the issues of poverty, illiteracy, casteism, and gender. This mode of thinking may suggest that it is the common 'illiterate' masses who have failed the nation. Reference to these issues, therefore, tends to understand the nation from an elitist point of view. The curriculum must be able to show the nation and national unity figures in the local perceptions of the people. Local perceptions, therefore, have to be articulated through reorienting the curriculum. It is in this context that this Focus Group suggests an epistemological shift in reorienting/redesigning the curriculum so as to accommodate the multiple ways of imagining the Indian nation.

3.1.2. The general perception was that the textbooks were the major source of generating knowledge. Thus, the major focus of social science teaching was on instruction that normally resulted in foreclosing any possibility of innovation that presupposed an active participation of the learners, both teachers and students. Since the textbooks necessarily excluded initiative on the part of learners, the Focus Group suggest that the notion of the textbook be changed from being merely instructive to being more suggestive. It is argued that this would offer enough scope for the learner to go even beyond the very textbook, thus whetting the learner's appetite for further reading that is necessary to enrich the understanding of a given social phenomenon. The Focus Group thus suggests the need for a more dynamic, self-conscious, and hence open-ended textbook, one that focuses on the centrality of the experience of the child to develop his/her cognitive capacity.

3.1.3. The major thrust of the social science curriculum has remained utilitarian in nature. That is to say, it puts more emphasis on developmental issues that are important but not sufficient to understand the normative dimension, for example, issues of equality, justice, and dignity in society and polity. The teaching of the social sciences has thus been linked to the role of an individual in contributing to this 'development'. In view of this gap, there is a need to achieve a shift in focus from utilitarianism to egalitarianism that would address the normative concerns as mentioned above. Utilitarianism is painfully evaluative, thus classifying disciplines into more useful and not so useful. That is to say, it favours those disciplines that are capable of contributing to development. Those disciplines that are not able to directly contribute to development are bound to be treated as worthless. Therefore, there is a need to restore self-esteem to the social sciences by making them more egalitarian in tenor.

For example, history has been taught with a strong element of utilitarianism, which necessarily suggests the production of nationalism through building history curricula around national 'heroes' and not around the communities that also make history. Non-utilitarian history would be one that would not only look at the one dominant narrative of the nation's past but would also allow multiple readings of events from various perspectives.

3.1.4. It is suggested that there is a need to bring about a change in nomenclature, from civics to political science. This change is sought on the following ground. Civics as a subject had appeared in the Indian school curriculum during the colonial period against the background of increasing 'disloyalty' among Indians towards the Raj. An analysis of the first textbook of civics, *The Citizen of India*, authored by Lee Warner, shows that civics was intimately linked to the colonial project of rule, cultural assimilation, and establishment of British hegemony (Jain 1999). [This citation needs to be added to the List of References at the end of the report] Emphasis on the obedience and loyalty of citizens; the colonial ethos of order, improvement, and rationality; the discourse of the shortcomings of the personality of the natives and Indian society; the projection of the state as an agent of change within the native [states?]; and the creation of civil society according to the universal values of progress—these were the key features of colonial civics (ibid.). Many postcolonial civics textbooks in India suggest that the subject in its premises, conceptualisation, and articulation in the textbooks [??] awaits decolonisation [just?] like our education [system?]. [awkward sentence construction, meaning not clear. Please recast sentence for greater clarity]

In the various articulations of civics, its role has been visualised as one of 'informing' and developing 'responsible citizens', who will assist the state in its 'efforts' and will display 'desirable attitudes and social behaviour'. This reiterates the colonial vision of education as a morally uplifting influence. The employment of this vocabulary is based on the belief that Indian citizens lack the qualities of good citizenship. It perceives people as irresponsible towards both self and society, and regards this failure to fulfil their duty as proof of the moral weakness of the citizens. This moral weakness is seen as a result of their ignorance about state institutions and the government's efforts. It is believed that by providing information, the people could be made aware and that 'desirable attitudes' could be created among them. It reiterates the importance of rationality as a marker of the citizen's identity as opposed to emotionalism. Through differentiation between legitimate and illegitimate demands, it accords the power of the state to provide legitimacy to people's demands and struggles.

On the contrary, political science suggests a dynamism that involves a process that produces structures of dominance and their contestations by social forces. Political science imagines civil society as the sphere where more informed, receptive, and responsible citizens could be produced. Indeed, political science treats civil society as the sphere that produces more sensitive, interrogative, deliberative, and transformative citizens.

3.1.5. Gender concerns are usually addressed within the social sciences by including women as 'examples'. For instance, in history the discussion on women is often limited to including Rani Lakshmibai, Sarojini Naidu, and some others in the chapters on India's freedom struggle. This approach fails to take into consideration that the idea of gendering the curriculum is not limited to the increased representation of women. Rather, what is crucial in addressing issues of gender is the need to make the perspectives of women integral to the discussion of any historical event and contemporary concerns. This shift—from highlighting individuals to forefronting women's struggles both historically as well as on a daily basis—requires an epistemic shift from the patriarchal nationalist frame within which social studies is currently conceptualised.

The epistemic shift proposed above can be summarised as follows:

- Shift from the elitist perspective of the nation and its past to the perspectives of the masses.
- Shift from the textbook as the only source of information to the textbook as suggestive of a particular way of understanding issues.
- Shift from utilitarianism to egalitarianism.
- Shift from 'civics' to 'political science'.
- Shift from the patriarchal frame to one that privileges the perspectives of women.

4.0. OVERALL OBJECTIVES OF TEACHING THE SOCIAL SCIENCES

The general objectives of teaching the social sciences are:

- Enabling children to understand the society in which they live.
- Introducing children to the values enshrined in the Constitution of India such as justice, liberty, equality, and fraternity, and the unity and integrity of the nation, and the building of a socialist, secular, and democratic society.
- Enabling children to grow up as active, responsible, and reflective members of society.
- Enabling children to learn how society is structured, managed, and governed, and also about the forces seeking to transform and redirect society in various ways.
- Enabling children to learn to respect differences of opinion, lifestyle, and cultural practices.
- Engaging children to undertake activities that will help them develop social and life skills and make them understand that these skills are important for social interaction.
- Encouraging children to question and examine received ideas, institutions, and practices.
- Encouraging the reading habit by providing children with enjoyable and interesting reading material.

Schooling is an important part of the process of socialising the child. At all stages of school education, the content, language, and images should be comprehensible, gender sensitive, and critical of social hierarchies and inequalities of all kinds.

5.0 PRIMARY STAGE

The objectives of teaching the social sciences at the primary stage are:

- To develop in the child skills of observation, identification, and classification.
- To develop in the child a holistic understanding of the environment with emphasis on the interrelationship of the natural and the social environments.
- To sensitise the child to social issues and develop in him/her a respect for difference and diversity.
- To sensitise the child to various dimensions of inequality in society.

5.1. Classes I and II

For these primary grades, the natural and the social environments will be explained as integral parts of languages and mathematics. Children should be engaged in activities to understand the natural and social environments through illustrations from the physical, biological, social, and cultural spheres. The language used should be gender sensitive. A Teachers' Handbook should be prepared with examples of activities that promote the development of concepts and teach sensitivity towards environmental concerns. Teaching methods should be in a participative and discussion-oriented mode. For example, story telling, painting, dance, song, and music can all be part of the teaching-learning process.

5.2. Classes III to V

For these grades, the subject Environment Studies (EVS) will be introduced and will be constituted by a discussion of the natural and the social environments. In the study of the natural environment, emphasis will be on its preservation and the importance of saving it from degradation. The fact that the social environment is constructed by human beings will be emphasised. Children will begin to be sensitised to social issues like poverty, child labour, illiteracy, caste and class inequalities, etc. in both rural and urban areas. The content should reflect the day-to-day experiences of these children and their life worlds.

At this stage, all concepts taught should be activity based. Activities and textual material should complement each other. Activities should be related to examples from local

surroundings. A Teachers' Handbook should be prepared that gives clear directions on how to handle different topics.

6.0. UPPER PRIMARY STAGE

The objectives of teaching the social sciences at the upper primary stage are:

- To develop an understanding about the earth as the habitat of humankind and other forms of life.
- To initiate the learner into a study of her/his own region, state, and country in the global context.
- To initiate the learner into a study of India's past.
- To introduce the learner to the functioning and dynamics of social and political institutions and processes of the country.

At this stage, the subject areas of the social sciences—drawing their content from history, geography, political science, and economics—will be introduced. Simultaneously, the child may be introduced to contemporary issues and problems. Contemporary issues may be looked at from multiple perspectives, introducing the child to social and economic problems of society. Emphasis needs to be given to issues like poverty, illiteracy, child and bonded labour, class, caste, gender, and environment. The child can also be introduced to the issues of the global distribution of economic resources and the ongoing processes of globalisation. The elements of geography will be introduced to promote the understanding of interdependence of various regions and countries. Similarly, Indian history will be taught emphasising the concepts of plurality and change. The child will be introduced to the formation and functioning of governments at the local, state, and central levels, and the democratic processes of participation.

Eklavya

The Class VII civics textbook prepared by Eklavya is a serious attempt to introduce sociological discourse into the social science curriculum. It enables reflection on the given judicial structure in the country. The case studies and events described in this chapter. Don't you mean civics textbook? Please check] ensure that it is received well by the children. However, it does throw up a significant problem. A strong sense of romanticism about caste-based panchayats emerged among teachers. Responses varied from teacher to teacher, but the dominant effect was one of undermining the modern system of justice in favour of caste-based panchayats. The modern form of the judiciary is likely to be taken less seriously by teachers in their discussions with children, and it is likely that the caste panchayats will be regarded as more fair and speedy in dispensing justice.

7.0. SECONDARY STAGE

The objectives of teaching the social sciences at the secondary stage are to develop among the learner analytical and conceptual skills to enable him/her to:

- understand the processes of economic and social change and development in relation to contemporary India.
- critically examine social and economic issues and challenges like poverty, child labour, destitution, illiteracy, and various other dimensions of inequality.
- become aware of the problems of socially disadvantaged sections of society.
- understand the rights and responsibilities of citizens in a democratic and secular society.
- understand the roles and responsibilities of the state in the fulfilment of constitutional obligations.
- understand the processes of change and development in India in relation to the world economy and polity.
- appreciate the rights of local communities in relation to their environment, the judicious utilisation of resources, as well as the need for the conservation of the natural environment.
- gain an understanding of world history.

7.1. At the secondary stage, the social sciences comprise elements of history, geography, political science, and economics. The main focus will be on contemporary India, and the learner will be initiated into a deeper understanding of the social and economic challenges facing the nation. In keeping with the epistemic shift proposed, contemporary India will be discussed from the perspectives of the adivasi, dalit, and other disenfranchised populations, and efforts should be made to relate the content as much as possible to the children's everyday lives.

India's freedom struggle and the contributions of various sections/regions shall be studied. India's nationalist movement and its development as an independent nation will be taught in the context of developments in the modern world. Issues relating to geography should be taught keeping in mind the need to inculcate in the child a critical appreciation for conservation and environmental concerns. In political science, the focus should be on discussing the philosophical foundations that underlie the value framework of the Indian Constitution, i.e. an in-depth discussion of equality, liberty, justice, fraternity, dignity, plurality, and freedom from exploitation. As the discipline of economics is being introduced to the child at this level, it is important that the topics discussed should be from the perspective of the masses. For example, the discussion of poverty and unemployment should no longer be undertaken in terms of statistics, but instead should derive from an understanding of the elitist functioning of economic institutions and the inequality sustained by economic relations.

Also, given that this is the stage at which choices are made about which disciplines to pursue for further study, it is important that students be introduced to the nature, scope, and methods of each of these disciplines. Needless to say, the latter should not overload students with additional information, but instead should explain to them what the future study of the discipline might hold in store and link these points to the creation of desirable skills.

8.0 APPROACHES TO TEACHING

Social science teaching needs to be revitalised in order to help the learner acquire knowledge and skills in an interactive environment. It has often been noticed that there is an increasing gap between the promises made in the curriculum and what is happening at the level of the child's perception. It is important that the process of learning should promote the spirit of inquiry and creativity among both children and teachers.

The teacher is an important medium of transacting the curriculum and simplifying concepts in a language comprehensible to students. Therefore, teaching should be seen as an opportunity for teachers and students to learn together, thus developing a democratic culture within institutions. In order to make the process of learning participatory, there is a need to shift from the mere imparting of information to involvement in debate and discussion. This approach to learning will keep both learners and teachers alive to social realities.

Concepts should be clarified to the students through the lived experiences of individuals and communities. For example, the concept of social equality can be understood better through citing the lived experiences of communities that make up the social and cultural milieu of the child. It has also often been observed that cultural, social, and class differences generate their own biases, prejudices, and attitudes in classroom contexts. The approach to teaching, therefore, needs to be open-ended. Teachers should discuss different dimensions of social reality in the class, and work towards creating increasing self-awareness both amongst themselves as well as among the learners.

The increased provision of supplementary material in the classroom will increase the autonomy of the teacher vis-à-vis the textbook and also provide a level of confidence in planning activities and projects. The need for a finite syllabus to incorporate infinite cultural and local contexts can be taken care of through the generation of these materials.

> Teachers can elaborate on the idea of involving children in various activities so that they can learn certain concepts through lived experiences. For example, children can learn about the cooperative movement by running a cooperative themselves. Schools need to be accessible at all hours to teachers so that they can plan their learning activities accordingly. For example, learning about the moon should include the possibility of being able to watch the moon from the school premises, and therefore the need for the school to remain open to accommodate this activity.

The Focus Group also discussed the adverse effects that the minimal provision of infrastructure and poorly qualified para-teachers have on the learning of the discipline. The linkages between adequate infrastructure and the teaching of social studies is not often commented upon because instruction in the subject requires no obvious space like the way in which a laboratory is required for the teaching of science. However, the effective teaching of social science is crucially linked to the efficient functioning of the school library and of teachers who are trained to use the resources that the library provides towards the creation of challenging projects and activities. This shift away from rote learning to comprehension through the implementation of projects can only take place if the teacher is able to assess the child's understanding through other means rather than just the completion of the project. A more nuanced assessment of whether the child is learning through project work might help mitigate the present 'manufacturing' of these projects in the market as ready-made objects that parents can buy. It will also help to modify the prevailing belief that increased marks on project work translates into 'easy marks' to be gained with the least effort.

Local Crafts and Museums

In order to make the learning of social science more enjoyable and effective, there is a need for innovations in teaching methods. Social science learning should involve visits to museums at local, state, and national levels. Students may be asked to explore the local surroundings and observe the activities of artisan communities engaged in different crafts using local skills and materials. These handicrafts may be displayed in a small corner of the school and developed into a museum.

The schools could have their own social science museums. During the summer break, students may be asked to make models of historical monuments, working models of volcanoes or earthquakes, crossword games or puzzles. The children may sketch or paint phenomena related to the natural environment. Newspaper cuttings or articles from various magazines related to topics in the school syllabus and social science subjects, or some related information downloaded from the Internet, can be collected and displayed. This museum could be laid out in different ways from time to time before it becomes outdated. Students may also be involved in other activities such as:

- A Social Science week can be celebrated in the school.
- Students may be taken out to visit a nearby museum or centre of arts and crafts.
- Students can be encouraged to watch the night sky, observe the phases of the moon, note the timings of sunrise and sunset, describe the duration of day and night, and asked to record their experiences and observations in a journal.
- Students can be taken to visit some historical monuments and can sketch these monuments and write about them. All good sketches can be displayed in the museum.

9.0. Teacher Training

In the past, the teaching of social science has not been very effective partly due to the lack of an adequate emphasis on teacher's training programmes. While the pre-service training syllabus needs a thorough review, the in-service training should also be given attention. The state has to provide the necessary logistical and financial support for effective in-service training from time to time so that the teachers' understanding of the subject is updated. The use of Teachers' Handbooks in the different disciplines of the social sciences should be made mandatory. The textbooks, instead of being treated as the 'only source', should be seen as 'one of the sources' for developing one's understanding. Indeed, many problems like *low self-esteem, curricular load, cramming, and rote learning* can be addressed more effectively by an empowered teacher whose capabilities have been enhanced through teacher training. The outcome of social science research studies could be made accessible to the vast numbers of teachers through serious and effective training both at the pre-service and the in-service levels.

10.0. TEACHING-LEARNING MATERIALS

The following issues may also be taken into account while developing teaching-learning materials.

- Equal teaching time and marks should be allocated to the various components in the social sciences.

- A right balance should be maintained in the distribution of themes among the different disciplines, and wherever possible interrelationships should be indicated.
- Topics should be logically arranged in the right sequence, maintaining consistency throughout the syllabus.
- In textbook production, it should be ensured that all sections of the book have an equal numbers of chapters.
- A glossary of technical terms after each chapter and an index at the end of the book should be provided.
- Before publication, the textbooks should be vetted to check inadvertent gender and social bias.
- Before publication, the textbooks should be examined to avoid duplication and ensure uniformity of style.

Higher Secondary Stage

Ten years of general schooling offer a common scheme of studies for all students. The higher secondary stage is considered important as it offers a choice of streams to the students according to their need, interest, and aptitude. For some students, this stage may be the end of their formal education, leading to the world of work and employment; for others, this stage may be the foundation for pursuing higher education. They may choose either specialised academic courses or job-oriented vocational courses depending upon their preferences. The foundation laid at this stage should be able to equip them with basic knowledge and the necessary skill and attitude to make a meaningful contribution to any field they choose. The courses need to be designed and planned carefully, keeping in view the students' wide variety of preferences in order to make this a less stressful experience.

The foundations of education should be strengthened at this stage by making it flexible and diverse with the aim of not only equipping students to join the world of work but also providing appropriate linkages with higher education. While accepting the goals of diversification and flexibility, the basic parameters of equity and excellence cannot be ignored. The needs of students belonging to different regional, cultural, and social backgrounds should also be taken into consideration in a proper and careful manner.

It is important that our national standards today should also be able to meet the challenges of global competition by designing a variety of courses of studies; preparing detailed curricular outlines; identifying learning outcomes; producing a variety of instructional materials—audio and visual—and multimedia packages; and innovating improved evaluation tools.

A variety of courses from the social sciences and commerce may be offered to students, and they may exercise their choice keeping in view their inclinations and preferences. Subjects and courses need not be grouped into separate streams, but students may be given the choice of opting for subjects or courses from any group according to their need, interest, and aptitude. At this stage, the social sciences may include disciplines like political science, geography, history, economics, sociology, and psychology. Commerce may include business studies and accountancy.

The objectives of the social science courses at this stage may be:

- to assist students to explore their interests and aptitudes in order to choose appropriate careers.

- to encourage learners to explore higher levels of knowledge in different disciplines.
- to cope with the changing demands of society.
- to promote problem-solving abilities and creative thinking in the citizens of tomorrow.
- to introduce students to different ways of collecting and processing data and information in specific disciplines, and help them to arrive at conclusions and generate new insights and knowledge in the process.

REFERENCES

(i) *Report of the Secondary Education Commission*, 1953.
(ii) *Report of the Education Commission*, 1964–66.
(iii) *The Curriculum for the Ten Year School: A Framework*, 1975.
(iv) *National Curriculum for Elementary and Secondary Education: A Framework*, 1988.
(v) *National Curriculum Framework for School Education*, 2000.
(vi) *Learning without Burden: Report of the National Advisory Committee*, Ministry of Human Resource Development, Government of India [give year].

DRAFT

HABITAT AND LEARNING

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EXECUTIVE SUMMARY

Taking good care of the human habitat, that is, of the environment that nurtures us, is emerging as one of the most significant concerns of the new millennium. As humanity endeavours to move onto a path of sustainable development, even as it enters the Information Age, it is evident that we need a new paradigm for education. Environmental education (EE) is ideally placed to serve as the lever for this paradigm shift that would focus, not on memorising what authoritative textbooks decree to be correct answers in order to reproduce them to get good grades, but instead on learning, on building capacity for critical thinking and problem solving. Since holistic thinking is at the heart of EE, the new paradigm would replace sectoral thinking by multidisciplinary thinking. The human habitat displays tremendous variability in space and time, and its understanding has to be locale specific, albeit in the context of a global vision. A great deal of the knowledge of the environment lies with India's barefoot ecologists, the people at the grass roots, and the new paradigm will be participatory, engaging members of local communities and will be sensitive to issues of diversity, gender and equity.

Given its intrinsic variability, each manifestation of the human habitat tends to be unique. Its understanding is, therefore, not amenable to the classical scientific approach of experimentation, usually based on replication. Instead, understanding of such complex systems requires extensive locality and time-specific observations, careful documentation, and an elucidation of the patterns and underlying processes based on comparisons of systems that differ from each other in some selected parameters. There is hardly any good quality documentation available today of the many facets of India's environment, such as the depth of the underground water table, and it is feasible to create such documentation on the basis of student projects. It would be possible to upload the results of such projects on a publicly accessible website, thereby creating a transparent and comprehensive database on India's environment. By inviting not only experts, but also all interested citizens to assess the quality of such projects and augment their results, a self-correcting system could be set up that would lead to an organic growth of our understanding of the Indian environmental scenario and concrete ways of undertaking positive action. Including such knowledge-generation activities as a part of the educational process would greatly enhance the quality of the educational experience as well.

Of course, working towards such a paradigm shift is a major challenge and the Group recommends that we do so through efforts in six major areas:

- Curricula revision;
- Materials development: conventional media;
- Taking advantage of Information and Communication Technology (ICT);
- Teacher preparation;
- Evaluation system;
- The school habitat;

The Group has also sketched a road map for organising this effort over a period of five years, beginning serious work from the first year onwards. The Group recognises that the Hon'ble Supreme Court's judgment emphasising the necessity of teaching EE as a compulsory subject at all stages underscores the significance of the concerns addressed by our Group, and is an important impetus towards the required changes.

It suggests a model of systematic infusion of EE into the curricula of all disciplines, with clearly earmarked time periods for undertaking the pertinent activities. The Group sincerely believes that if our recommendations are accepted, the resulting actions would follow the Supreme Court judgment in letter as well as in spirit.

1 INTRODUCTION

1.1 Exploring the human habitat

'Habitat and Learning' is the theme of a focus group set up as part of the National Curriculum Review process. Habitat is where any specie finds conditions that permit it to thrive. Learning is a vital faculty of all animal species. First and foremost, animals learn about the features of their own habitat, picking up clues as to where they may expect to find food, where they may expect to encounter enemies, and where they may expect to meet social companions. For our ancestors, knowledge thus began with the exploration of their habitat. In that sense, this focus group may be said to be at the centre stage of education, an enterprise dealing with knowledge.

Humankind's knowledge thus began with the exploration of its habitat and its features. This knowledge has great survival value, as was recently brought home to us by the ability of people living close to nature to more effectively escape the fury of the 26 December 2004 tsunami. But as human beings' control over the environment has increased, and as people have begun to mould the world more and more to suit their needs, this component of knowledge has diminished. So much so that today formal education has become largely alienated from the habitat of the students.

But as environmental degradation proceeds at an unprecedented pace, we are beginning to realise the importance of taking good care of our habitat. Humankind must, therefore, make an attempt to comprehend its roots, to re-establish links with its habitat, and to understand and take good care of it. In substance and spirit, then, the theme 'Habitat and Learning' is equivalent to EE. The formal curriculum of 'Habitat and Learning' needs, therefore, to be developed within the framework of EE.

Environmental contexts abound in diversity. EE cannot, therefore, be straitjacketed, but rather must emphasise continual inquiry. An important challenge before us is to inject into the learning process a spirit of questioning, to rid it of rote learning and of unquestioning acceptance of authority. Rather, the process of EE must become a vehicle for engaging young minds in the excitement of first-hand observation of nature, of understanding patterns and processes in the natural and social worlds, indeed, of participating in the enterprise of generating knowledge about this world.

1.2 An enormous challenge

Thus, to reorient education—to get away from a system in which students are being encouraged to do no more than mechanically reproduce what the authoritative texts decree to be the right answers to get good grades, and instead to encourage them to observe, to figure out, to generate knowledge on their own—is an enormous challenge. India is a large, heterogeneous country, with crores of students being taught by lakhs of teachers, often operating under conditions of inadequate facilities. We must also reckon with a society that has scant respect for manual work, and therefore little sympathy with the idea of getting out of the classroom and dirtying one's hands in the course of studying the environment. Lastly, we must also contend with malpractices like students resorting to buying ready-made projects to get good grades instead of putting in honest work on their own.

1.3 A continuing effort

Fortunately, we have a long tradition of pertinent efforts to draw upon, beginning with Mahatma Gandhi's movement of basic education. Nearly forty years ago, the Education Commission (Kothari Commission) called for bringing EE into the formal stream. Following this, many agencies—ranging from NCERT to NGOs like the Bombay Natural History Society (BNHS), Centre for Science and Environment (CSE), and Centre for Environmental Education (CEE)—have been active in this regard. Our group recommends a vigorous continuation of this effort, drawing on the strength of all these agencies. At the same time, new and exciting opportunities are opening up with the development of Information and Communication Technologies (ICT). These facilitate access to and sharing of information like never before. They also open up novel possibilities of the generation of new knowledge resources that may be scrutinised and augmented by all-interested citizens. One can thus, for the first time, visualise the elaboration of a publicly accessible and transparent database on India's environment, a modern and most effective follow-up to the path-breaking publication *State of India's Environment: First Citizens' Report* (1982) by Anil Agarwal and his collaborators more than two decades ago.

2 STATUS OF ENVIRONMENTAL EDUCATION IN SCHOOL EDUCATION

2.1 Background

The movement of basic education launched by Mahatma Gandhi in 1937 was an early serious attempt at relating education in schools to local environmental needs. The essential elements of basic education were: productive activity in education; correlation of the curriculum with productive activity and the social environment; and an intimate contact between the school and the local community. The education system in India had incorporated some aspects of EE in school curricula as early as 1930. The roots of the present status of EE in formal education can be traced back to the Report of the Education Commission (1964–66) (Kothari Commission). This Report also incorporated the best that basic education had to offer so as to relate it to the life, needs and aspirations of the nation. For the primary stage, the Report recommended that "the aim of teaching science in the primary school should be to develop proper understanding of the main facts, concepts, principles and processes in the physical and biological environment".

This recommendation could be implemented only in 1977 when the curriculum for the 10+2+3 pattern of school education was evolved at the national level by NCERT, and presented in the document 'The Curriculum for the Ten-year School: A Framework' (1975). The National Policy on Education (NPE, 1988) and subsequent curriculum frameworks brought out by NCERT in 1988 and 2000 reiterated the importance of EE in school education. Thus, EE has been one of the priority areas of concern in all curriculum development programmes. The syllabi and instructional material for science and the social sciences, and, to some extent, those for languages and mathematics, included enough content related to the environment essential for the fulfilment of the desired objectives. The textbooks of biology, chemistry, physics, geography, sociology and mathematics at the senior secondary stage, too, provided enough content on the environment to further strengthen the knowledge, understanding and skills acquired up to the secondary stage.

To summarise, some major initiatives of NCERT include:

- Continuing the practice of teaching Environmental Studies (EE) as EVS (science) and EVS (social studies) at the primary stage.
- The curriculum of general education for the upper primary and secondary stages, developed following the directives and guidelines provided in the National Curriculum Framework (NCF), has been quite wide-ranging on all aspects of the environment although EE was not perceived as a separate subject;
- Development of training modules for pre-service training by District Institutes of Education and Training (DIET) (one each for the northern, southern, eastern and western regions of the country);
- In-service training of key resource persons and teachers;
- Dissemination about EE through NCERT journals, e.g. *School Science*;
- Organisation of annual national- and state-level science exhibitions;
- Collaboration with international agencies (e.g. UNESCO, UNICEF, UNEP, World Bank, Commonwealth Secretariat) for various EE programmes. NCERT has also developed pre-service and in-service training materials on EE for some stages of school education under contract with UNESCO.

2.1.1 Initiatives at the State/UT levels

Along with their own initiatives, the States/UTs have either adopted or adapted the syllabi and instructional material of NCERT. An analysis of syllabi and textbooks prescribed in different States/UTs for the primary and upper primary stages in the mid 1990s revealed that there were many content areas pertaining to EE that were common to all of them.

2.1.2 Initiatives by Other Agencies

A number of other agencies, both governmental and non-governmental, have also been engaged in EE. These programmes pertain to both curricular and co-curricular interventions in school education. Notable among the governmental agencies are the Union Ministry of Human Resource Development (MHRD), Union Ministry of Environment and Forestry (MoEF), Department of Science and Technology (DST), Government of India, and their counterparts in the States. Some of the major initiatives include:

- 'Scheme of Environmental Orientation to School Education' launched by MHRD in 1988;
- Establishment of institutes offering pre- and in-service courses at different levels by MoEF;
- Establishment of the National Museum of Natural History (NMNH) and its regional centres (MoEF);
- Environment Education in the School System (EESS), a sub-component of the India Environmental Management Capacity-Building Project undertaken by MoEF and supported by the World Bank, with the Centre for Environment Education (CEE) as the consultant;
- National Green Corps aims to establish 150 eco clubs in each district of the country (MoEF);
- Establishment of Centres of Excellence by MoEF;

- Organisation of Children's Science Congress at the state and national levels every year by the National Council of Science and Technology Communication (NCSTC), Department of Science and Technology (DST).

A number of Non-Governmental Organisations (NGOs) in different parts of the country are also actively engaged in EE.

2.2 Present Status

The present status of EE in schools had its genesis in the National Policy of Education (NPE) 1986 (modified in 1992), in which 'Protection of the Environment' is stated as a common core around which a NCF would be woven. The National Curriculum Framework for School Education (NCFSE), 2000 also lists EE as one of the concerns to be integrated into the curriculum.

2.2.1 Primary and Upper Primary Stages

At the primary stage, in most States/UTs integrated textbooks on environmental studies have been prescribed. In some states environmental concepts have also been integrated into language and mathematics, while in some others EVS has been bifurcated as 'science' and 'society' for which separate textbooks-cum-workbooks have been prescribed. In the NCERT curriculum, the teaching of language and mathematics has been woven around the children's immediate environment in Classes I–II. In Classes III–V, separate textbooks for environmental studies have been provided. EE has been reinforced as a component of the Art of Healthy and Productive Living (AHOL). By and large, the textbooks of science and the social sciences in most States/UTs include environmental concepts. Environmental concepts have been included in the NCERT curricula for the upper primary stage mainly through science and technology.

2.2.2 Secondary Stage

The concepts of EE have been prescribed in the textbooks of most States/UTs through science and the social sciences whether taught as integrated or separate subjects. NCERT textbooks of science and technology and integrated social science include various concepts of EE.

2.2.3 Higher Secondary Stage

The majority of the concepts related to EE are found in the textbooks of biology, chemistry, physics, geography, economics, sociology and political science. This is true for NCERT and State/UT curricula.

In conclusion, it can be said that EE is a compulsory part of the syllabus in schools throughout the country. EE in schools invariably aims at providing children with knowledge, attitudes and skills so that they are equipped to contribute meaningfully towards the betterment of the environment and accomplish the goal of sustainable development. The review of environmental themes in textbooks at different stages of school education shows that textbooks, by and large, include environmental concepts.

2.3 Shortcomings

Despite these major initiatives, there is still very inadequate exposure of the students to their 'habitat'; there is little active learning from the natural and social worlds around them. The prescribed activities may simply be routinely taught as set material to be memorised through teaching in the classroom instead of being pursued by students on their own with an open mind. Activity-based projects may again be carried out in a routine fashion, sometimes with improper involvement of parents or even commercial agencies. It is clear that we need to recognise and address the challenges posed by these shortcomings as we attempt to forge ahead. This would be difficult to accomplish within the constraints posed by the current framework. Instead, we need to shift to a new paradigm.

3 NEED FOR A PARADIGM SHIFT

3.1 Objectives of Environmental Education

The main focus of EE should be to expose students to the real-life world, natural and social, in which they live; to enable them to analyse, evaluate, and draw inferences about problems and concerns related to the environment; to add, where possible, to our understanding of environmental issues; and to promote positive environmental actions in order to facilitate the move towards sustainable development. To achieve these goals, the curriculum may be based on:

- Learning about the environment;
- Learning through the environment;
- Learning for the environment;

These objectives assume great significance as humanity increasingly realises, after a long journey from Stockholm through Rio de Janeiro to Johannesburg, that a development paradigm that largely ignores the environment has disastrous consequences. In a world entering the new Information Age, education is becoming increasingly central to the development process. It has to help raise awareness, and build the capacity of communities to elaborate a vision and participate in the pursuit of environmentally and socially sustainable development. It must draw upon the new tools of ICT to do so. Truly meaningful EE is, then, a crucial activity that must lead the way for a paradigm shift in education to promote the pursuit of sustainable development.

3.2 New Paradigm

The new paradigm of education, embodying the spirit of science, of democracy, and of caring for the environment, would emphasise a number of key elements:

1. Learning rather than teaching;
2. Building capacity for critical thinking and problem solving;
3. Locale specificity in the context of a global vision;
4. Multidisciplinary approach;
5. Multi-sourced and accessed, rather than top-down, controlled and orchestrated in nature;
6. Participatory with broad involvement of peers and other community members;
7. Life long and continuous in character;
8. Sensitivity to diversity, equity and gender;
9. Knowledge generation;
10. Empowerment, rather than indoctrination.

This would be a paradigm appropriate to the pursuit of sustainable development in the emerging Information Age.

3.3 Method of science

Human knowledge has progressed through a series of stages. In its early stages, knowledge grew very slowly through a process of trial and error. It was often viewed as being revealed from some divine source, and called for an unquestioning acceptance of such an authority.

Modern science has elaborated a far more effective way of growing knowledge. This involves rejection of all authority other than that of empirical facts. Science has thus firmly grounded itself on the hard rock of empirical facts. Simply put, the methodology of science entails: observing facts directly; discerning patterns; inferring processes that give rise to observed patterns; making models of the working of the system under consideration; formulating hypotheses about the system; making predictions; verifying predictions through fresh observations of facts; revising models of the working of the system; and then making new predictions in an ever-continuing process. In the march of science anybody is welcome to challenge any assertion, whether it be of facts supposedly observed, or of models of how the system works. Along with rejection of all authority, science has also given up claims of arriving at any absolute Truth. Science deals in knowledge that is always treated as provisional, that is, open to being supplanted by newer and more effective observations and theories. This open, democratic and participatory exercise of science has proved tremendously effective in rapidly increasing our knowledge of the natural world.

Science should, therefore, be learnt as a dynamic experience rather than as a mechanical accumulation of facts. Engaging in the process of science; of undertaking first-hand observation of facts; of looking for patterns; of postulating models of processes that might be generating the observed patterns; of making predictions based on such hypotheses; of attempting to verify the predictions—this is by far the best way of imbibing the spirit of science. Of course, one must also endeavour to become acquainted with the great deal of knowledge that has been accumulated thus far—with the facts, patterns and processes ascertained by others and with the models of the working of the world developed by them. But reading all these accounts second hand in books and journals can never be a substitute for first-hand engagement with scientific activities, and there should be a proper balance between learning the facts of science and first-hand engagement in scientific activities. Many of these elements of the scientific method are equally pertinent to the exploration of other branches of knowledge as well. Science thus, very importantly, incorporates the first two elements of the new paradigm of education outlined above, namely, (1) learning rather than teaching, and (2) building capacity for critical thinking and problem solving.

3.4 Systems: Simple and complex

There are significant differences in the nature of scientific activities focused on the simpler physical and chemical systems and the more complex ones of concern to the environment. Simpler physical and chemical systems may be described with the help of a small number of parameters; this permits the design of replicated experi-ments to test predictions. As a result, our understanding of simpler systems has progressed enormously. Observing new, hitherto unknown facts pertaining to such systems, therefore, calls for highly sophisticated equipment and chemicals, and this is out of the reach of most educational institutions. Hence, the laboratory exercises of physics and chemistry necessarily tend to take students over well-trodden ground.

But with more complex systems, the situation is different. Complex systems characteristically require a large number of parameters for their specification. As a result, each manifestation of the system tends to be unique. Thus, every cyclone in the Bay of Bengal is different from every other recorded so far; each takes a slightly different course. Every patch of forest harbours a set of animal species slightly different from every other forest patch in the world. With these animals variously serving as grazers, pollinators or seed dispersers, and because of many other differences in the environmental regimes, the rates of regeneration of the different plant species in any given forest patch also differ greatly from patch to patch.

The experimental method of science depends on the experimenters' ability to control all relevant parameters and to replicate conditions at will. This poses serious difficulties in the case of complex systems. The experience of a group of Bangalore-based ecologists investigating the fate of wild amla populations on the nearby BRT Hills provides an interesting example of dealing with a complex system. Their hypothesis was that the regeneration of amla is governed by the amount of fruit collected for commercial use, and that the low levels of regeneration in recent years were related to excessive harvests of the fruit. So they laid out statistically well-designed randomised block experiments to test the influence of different levels of harvests of fruit. The local Solliga tribals told them that these experiments would yield no results of interest, because, according to their understanding of the ecosystem based on many years of first-hand observations, the levels of regeneration were primarily influenced by forest fires. Amla seeds require fire to germinate well, and the Solligas felt that the low levels of regeneration were related to the suppression of forest fires in recent years. The scientists did not initially give credence to this view and continued with their experiments. Only later did they come to the conclusion that the Solligas had indeed been right. Thus, since it is so difficult to discern what the relevant parameters are in a complex system, it is difficult to design meaningful experiments. The study of the environment thus necessarily incorporates the third and fourth elements of the new paradigm of education outlined above, namely, (3) locale specificity, of course, in the broader context of our overall understanding providing a global vision, and (4) multidisciplinarity.

3.5 Value of observations

The first-hand observations of the BRT Hills forest ecosystem by the Solligas had evidently provided them with an understanding of much value. On the other hand, elaborately designed experiments yielded little understanding because the experimenters had failed to identify the key parameters. Actual observations of these complex systems are, therefore, of vital importance in becoming acquainted with the empirical facts. Disciplines such as geology, hydrology, meteorology and ecology as well as the social sciences are, therefore, not amenable to the use of laboratory experiments in the same way as is possible in the case of physics or chemistry to acquaint students with empirical facts. Laboratory exercises do have a value in these fields as well, but the experiments must be complemented with actual observations in the field. Fieldwork has to be a vital component of learning in the study of complex natural and social systems. Hence, the study of the environment has to incorporate the fifth element of the new paradigm of education outlined above, namely, being (5) multi-sourced and accessed, often with one's own initiative, rather than being a discipline with a top-down, controlled and orchestrated nature.

3.6 Comparative method

Because of these difficulties, advancing knowledge through hypothesis testing in the sciences of complex systems has to take another route—that of the comparative method, taking advantage of natural experiments. The comparative method is based on compiling extensive information on a number of systems that differ from each other in a few features and generating hypotheses about the effects of such factors and testing them. For instance, lichens, symbiotic associations of algae and fungi that grow on rocks or tree trunks, are known to be sensitive to air quality in some parts of the world. India has several species that have not been studied in this fashion. So the best way for us to acquire an understanding of this phenomenon is to compare lichen floras on the trunks of the same species of trees growing on roads carrying heavy traffic and elsewhere where the air is cleaner. Similarly, one may use the comparative method to assess the impact of water pollution on fish and aquatic insect communities.

3.7 Recording new facts

Because of these limitations, science has made far more limited advances in documenting and understanding the behaviour of complex systems. A corollary of this is that new facts are being continually added to the storehouse of human knowledge. Even non-scientists may participate in this adventure. Thus, amateur astronomers find new comets and asteroids from time to time, and amateur bird watchers routinely publish lists of birds from new localities. Indeed, the barefoot ecologists of the country, common people close to the natural world, such as the Solliga tribals of the BRT Hills, have with them an enormous store of facts well above and beyond those recorded in the scientific literature. This is why high school or college students and teachers, too, can contribute their mite towards building a scientific understanding of the environment. Indeed, the systematic recording of such facts by students could help flesh out the picture of the state of human habitat; the students could engage not only in recording the basic facts, but also attempt to discern emergent patterns and understand underlying processes. This would be a most worthwhile learning experience as well. The study of the environment evidently incorporates the sixth and seventh elements of the new paradigm of education outlined above, namely, being (6) participatory with broad involvement of peers and other community members, and being (7) a life-long and continuous enterprise.

Of course, we cannot expect young children, right from the beginning of their school experience, to engage in careful observations that may contribute to a formally constituted database on India's environment. Rather, young children may begin with very simple activities that would gradually lead to more careful recording of observations, eventually helping to contribute to a formally constituted database.

3.8 Publicly accessible database

Today we have a dearth of quality information on the state of the habitat of humans and other living organisms of India. Of course, a large amount of information is collected in the form of government statistics, for example on the depth of the underground water table. However, such information turns out to be quite incomplete, often faulty, outdated, and, regrettably, largely inaccessible to the public. Yet the depletion of groundwater is a truly vital issue. Locally, such information is readily available from observations of open wells and from the experiences of people digging bore wells. It is quite feasible to compile such information locally, through school projects. The projects could be so designed as to keep the information updated and then make it available through an electronic database. From this point, we certainly have the technology to put together an all-India picture and make it available as a transparent and publicly accessible database through a website.

Such information may be collected on a great variety of themes ranging over physical, chemical and biological parameters to social, political and legal issues. These may pertain to soils, minerals, water, and natural, semi-natural and man-made habitats and biological communities. They may pertain to human activities such as hunting, fishing, agriculture, animal husbandry, mining, and the construction of roads, dams and buildings. They may relate to health and sanitation issues. They may relate to landownership and tenure issues. They may involve questions of social and economic status, gender and other equity issues. They may relate to customary and formal legal regimes. They may address themes relating to the management and development of natural resources.

Consider, as an example, the use of groundwater in the coastal tracts of the Uttara Kannada district of Karnataka. Traditionally, the crops of this region include rice (largely cultivated by smallholders) and betel nut, primarily cultivated by richer orchard owners. When, fifty years ago, there were no electrified pump sets, the water table was at a depth of about five metres, and the smallholders were able to hand irrigate and raise a second crop of rice in the winter. Following rural electrification, free power was made available to farmers along with subsidised pump sets. These facilities were primarily availed of by the orchard owners, who began to extensively irrigate betel nut in the dry season, substantially increasing its yields. But this drove the water table down. As a result, the smallholders could no longer raise a second rice crop. This has compelled their women to switch to the sale of fuelwood as a livelihood activity in the dry season, resulting in extensive conflicts with forest authorities and the degradation of forests at a rapid pace.

This highlights the significance for the study of the environment of the eighth element of the new paradigm of education, namely, (8) sensitivity to issues of diversity, equity, and gender. At the same time, it stresses the relevance of the fourth element, namely, (4) multidisciplinarity.

3.9 Scientific exercises

Using the data available on such a transparent and publicly accessible website—developed, at least in part, on the basis of school exercises—it would be easily possible to undertake a number of scientific exercises based on the comparative method applicable to the study of complex systems. Thus, one may visualise on such a website countrywide spatial data on soil and rock types, rainfall and cropping patterns, and human population density, along with data on the depth of groundwater. Students could access such data and undertake statistical analyses of different levels of sophistication to assess the influence of various factors on the depth of the underground water table. They may then be introduced to the world of hydrological models and try to understand the underlying processes. Thus, educational experience could be most fruitfully combined with the ninth element of the new paradigm of education, namely, (9) knowledge generation. Of course, knowledge is power, and these exercises could promote the last of the elements of the new paradigm of education, namely, (10) empowerment, rather than indoctrination.

Of course, a number of individual projects that could generate useful inputs for such an endeavour, such as surveys of plant and animal species, have been and are being conducted in many schools in the country today. Some of these are being conducted on an all-India basis within a common framework as well, as is the case with the Children's National Science Congress programme of DST. However, these are not geared towards compiling the information collected to create a broader picture. Once such a broad picture is available, a number of additional educational and environmental activities of great interest will become possible. These will lead to the emergence of answers to questions of much social relevance.

3.10 Karnataka experience

The Centre for Ecological Sciences (CES) at the Indian Institute of Science (IISc), Bangalore has been engaged in experiments on such a model with a number of high schools and junior and degree colleges in Karnataka since 1993. These experiments have demonstrated that good quality data can be collected by deploying student power provided that sufficient efforts are devoted to developing a proper methodology, resource material and training programmes. As an example, students of 42 Karnataka high schools collected data on the various levels and recent trends in local abundance for 172 out of 300 medicinal plant species used commercially in the state. Only limited information on 27 of these species is available with government agencies or the pharmaceutical industry.

3.11 Relational Database Management System

The CES at the IISc, Bangalore has also developed a Relational Database Management System (RDBMS) that would support such a programme of creating a countrywide, open, transparent and publicly accessible information system on different facets of India's environment. The system, currently focusing on biodiversity, provides for simple, user-friendly data-entry forms that students can use to enter data on a variety of topics including:

- Relationship of people to their natural resource base;
- People's knowledge about their habitat;
- Ecological habitats and their distribution;
- Biological species, their current status, and changes in abundance and distribution;
- Uses of biological species;
- Current and desired management practices for management of biological resources.

The database is available not only in English, but also in major Indian languages. This RDBMS can easily be built upon to broaden its scope and include other areas of interest, such as issues relating to water management. Currently, it is a CD-based version using Access with a Visual Basic front-end. CES expects to soon make available a Web-based version using MYSQL database and PHP scripts.

In addition to the RDBMS, CES has also developed CD-based resource material to assist in the proper classification of ecological habitats and the identification of significant biological species. This takes advantage of the fact that a large number of colour images as well as animal calls can be made available at very affordable costs using CDs. This resource material, too, is being prepared not only in English, but also in major Indian languages. CES is in the process of developing freely accessible Web-based material as well.

3.12 A worthy challenge

With its long traditions of learning, its wealth of folk knowledge, its diverse ecologies and rich heritage of biodiversity, and its strengths in information technology, India can take the lead in involving its student body in exciting learning experiences that would, at the same time, create a publicly accessible database on environmental issues of great social relevance.

4 IMPLEMENTATION STRATEGY

4.1 A Step-by-Step Approach

The changes envisioned in this new paradigm involve a major shift in our thinking of education as a process of 'learning' rather than 'teaching', and, going even further, of involvement in the active generation of knowledge. This cannot be done by merely changing the curriculum and the textbooks, but needs a more fundamental change in the way that teaching-learning happens and the way that knowledge is viewed in the school. Unfortunately, the current examination system is not just a way of measuring what the student has learnt but it also actually governs what is learnt. The final examinations, especially for Classes X and XII, determine a child's future in a way disproportionate to his or her achievements in other faculties. This is likely to continue to be the case for some time. Unless a change in the examination system happens simultaneously, one cannot expect to make a fundamental change in the system of school education.

The other major determinant of change is the teacher and his/her role. To move away from the traditional role of a teacher and to become a partner and facilitator in the process of the child's learning and knowledge-generation activities is not a small step. First of all, it calls for a major change in perspective. It also involves learning certain new skills, competencies and techniques. In pre-service training, such changes would eventually and very gradually lead to such a transformation. To hasten the change, a very effective and efficient in-service training programme needs to be implemented.

The changes in the curriculum and teaching–learning materials need to be seen in this context. A lot of good materials are available and one can draw on the experiences of numerous experiments and projects. However, a system that links learning and the process of knowledge generation to the environment cannot be one that can be wholly based on centralised materials. It needs to capture local flavours, to be adapted to the needs of a particular region, to become locale specific. This will necessitate a change in the way that curricula are written and textbooks and teaching materials are prepared.

The education system in India is hampered by its huge inertia. Change in such a system cannot be brought about merely through a shift in policy. It will involve a total system change carefully executed in a step-by-step fashion, with the active involvement of both the Central Government and the governments of States/UTs. It needs to be stressed here that education being a subject on the Concurrent List, the involvement and commitment of the governments of States/UTs is vital.

4.2 Components

There are six major components that will need to be worked on simultaneously to successfully bring about these changes in the system of school education:

4.2.1 *Curricula revision*

The curriculum dictates what is taught and how it is taught. This is thus the crucial foundation of our effort. Considerable thought needs to be given to setting the objectives for EE at the school level, and in translating this into syllabi, textbooks and teaching-learning processes.

4.2.2 *Development of material: conventional media*

EE will require the development of locale-specific teacher, student and classroom material. 'Greened' textbooks, which are written from a holistic environmental perspective in terms of both their content and pedagogy, and which encourage flexibility to bring in locale specificities, are at the core of this endeavour. In order to arrive at such instructional material there needs to be a serious rethinking on the approach to writing textbooks. Teachers need handbooks that help them to teach the texts effectively. For the hands-on part of EE, student workbooks and teacher manuals are required. Charts, reference material, etc. are also needed. This would involve not only the print medium, but also audio and audio-visual material as well as the new electronic media. The approach need not have all the material developed centrally, but should be designed to facilitate the development of quality material regionally and locally.

4.2.3 *Taking advantage of ICT*

EE could lead the way in effectively including the manifold capabilities of the new media in changing the paradigm for education. Already, many students, especially in the metropolitan schools, are using computers to access curricular material. They also surf the Web to access related information, especially to carry out project assignments. We are suggesting that we go beyond these activities, and use these media as tools to augment the knowledge base on India's environment by getting students involved in generating knowledge. This calls for developing software to support EE project work of students through communicating proper methodologies of data collection, help validate identification of plant and animal species or of soil and rock types, and organise databases capable of accepting data from many sources. We need to design appropriate websites and put in place mechanisms for the moderation of the content. We need to organise experts' and citizens' discussion groups to comment on and add to the quality of the material on this website..

4.2.4 *Teacher preparation*

It is accepted that quality EE involves both change in content quality as well as change in how this content is transacted in the school. Teachers will be the key to the successful transition to EE. In order to do this, major initiatives in the area of teacher training—both in-service training and pre-service teacher training—for teachers of all the different levels in the school system will be required. This training will need to help the teachers understand environmental concepts, concerns, issues and efforts; to enable them to work with students to communicate this information and knowledge; to create an awareness, attitude, and concern; and to facilitate their taking up environmental action. The teachers will need to be empowered to lead their students in undertaking locale-specific hands-on activities, projects, field studies, etc., and to integrate the results of these activities into the proposed public database on the state of India's environment.

4.2.5 Evaluation system

What is evaluated is what determines what is taught and how it is taught. In order that we may be able to bring about the changes that we desire, we need to change the method of evaluation: evaluation in terms of the examination system; evaluation of projects, field studies and activities; evaluation of teachers; and evaluation of schools. The evaluation system must be able to ensure that projects are actually done; that the projects are of high quality and are locale specific. Considerable research, development and testing are required for this. Some tools that are already available and can be a starting point are: open-book examination; alpha marking; examining in depth what the student says he/she knows; workbooks, etc. Similarly, how teachers and schools are assessed needs also to reflect the objectives of EE.

Currently, the evaluation is conducted by a small group of people, or is done in a mechanical fashion as through grading of responses to multiple-choice questions. If we could organise a system of posting the results of EE projects on a publicly accessible website with proper credit to the students and teachers involved, a novel and participatory system of evaluation could be put in place. For then local experts as well as lay citizens familiar with the situation would have the opportunity of pointing out any mistakes, of adding to the information posted, and in the process pointing to the quality of the project. This may encourage students to strive to do well. It would also help check malpractices such as purchasing projects from commercial sources.

4.2.6 The School Habitat

The school must be a demonstration of the environmental values that the education system tries to convey. Whether the context is that of drinking water and sanitation facilities, paper, energy use, garbage management, composting, or greening, the school needs to exemplify good practices and needs to communicate these, through demonstration, not only to the students but also to the community. These resources need to be built up with the involvement of the community and various other stakeholders. Locale-specific standards need to be set for this, but care needs to be taken to ensure that central models are not propagated. Classroom education needs to support the understanding, use and maintenance of this infrastructure.

4.3 The methodology for developing these components

4.3.1 The Curriculum Framework

It is envisaged that the curriculum framework, to be evolved after reviewing the existing one, will define the:

- Overall aims and objectives of school education;
- Place of EE in the school curriculum;
- Place of EE vis-à-vis other subjects of study.

It is expected that the curriculum framework would also deliberate on the need for imparting EE, the form in which it is to be introduced at different stages of school education, issues and problems concerning its implementation, and the weightage to be given to EE in terms of time and allocation of marks, besides other related issues.

4.3.2 Syllabi and Instructional Material

Development of syllabi and instructional material in a given subject of study, primarily textbooks, is the most logical step to be followed after the identification of specific objectives both stage-wise and class-wise. However, the scope and purpose of this exercise is likely to be quite different in the case of EE due to its inherent nature and specific needs to contextualise learning experiences extending from local to global environmental issues and concerns. It may be difficult to meet this requirement through centrally developed syllabi. The syllabi of EE and related instructional material are, therefore, expected to be as locale specific as possible. The syllabi and instructional material to be developed at the central level, say, at the national or state level, could at best provide the broad content outlines and themes around which the transaction of EE in schools needs to be done. There has to be sufficient scope and direction to translate these broad guidelines into teaching-learning situations in the context of locale-specific environmental problems and issues. The syllabi of EE at the central level are, therefore, not expected to be in the form of statements of specific topics but in a form that could be further interpreted and translated at the district/ region/block levels without compromising the overall aims and objectives of EE.

The development of the syllabi and model instructional material at the national/ state level, therefore, will be one of the most crucial factors in shaping the courses on EE. The institutions that could be involved at this stage of development of EE materials may be NCERT, SCERTs, NGOs, and experts from universities/colleges/research institutions. The possibility of preparing more than one variant and trying them out in schools may be explored in order to evolve the most suitable designs of syllabi and instructional material.

4.3.3 Projects and Activities

Projects and activities will be the backbone of any scheme aimed at the effective implementation of EE in schools. In order to inculcate the desirable skills and competencies, it will be imperative to develop a basket of activities and projects that may vary in range in respect of their difficulty levels, coverage of skills and parameters of environment, as also the feasibility of carrying them out within the limitations of teacher competency, available resources and time. However, a certain number of activities need to be designed in a coordinated fashion to generate information that would feed into the public database on a variety of environmental issues such as the depth of the groundwater table, frequency of landslides, quality of surface water, density of vectors of diseases such as mosquitoes, availability of medicinal plants, abundance of wildlife species such as langurs and macaques, amount of open space surrounding buildings in urban localities, violation of traffic rules and so on. Some of these issues, such as the depth of the water table, might be covered by schools throughout the country. Others, such as the frequency of landslides, may be more region specific. It is envisaged that students of a given stage from almost all schools in the country, or in the pertinent region, will be involved simultaneously in such activities. As such data accumulate they will open up possibilities for other kinds of worthwhile projects. Students at secondary and senior secondary levels may undertake analysis and interpretation of such composite data, along with the modelling of phenomena such as water balance and energy flows in ecosystems.

The development of a basket of activities and projects with so many variations— and one that is at the same time feasible for the effective teaching-learning of EE and for the generation of knowledge on the state of India's environment—is a major undertaking and calls for the involvement of expertise at the highest level.

4.3.4 *Assessment and Examinations*

All efforts aimed at reforming school education so far have failed to yield the desired results primarily due to lack of success in reforms in the examination system. This particularly holds true for assessing achievement in the affective and psychomotor domains. Indeed, an objective assessment of students' achievement in activities involving laboratory experiments and fieldwork has been one of the prime concerns of school education. Since the development of appropriate attitudes, skills and values is to be the most significant component of EE in schools, developing a scheme to assess students' achievement on these aspects will perhaps be the most crucial in determining the success of interventions through the EE curriculum. It may be worthwhile to evolve a variety of assessment strategies for a given type of activity, and refine them through trying them out on a pilot basis to arrive at practical and feasible modes of assessment. As mentioned above, this may involve radically new methods such as exposure of the project reports on websites accessible to the public, inviting comments of all interested citizens.

4.3.5 *Teacher Empowerment and Orientation of Other Functionaries*

4.3.5.1 Development of Training Modules

Teachers are the key agents for the success of any exercise for curriculum reform in school education. This is more so for EE as EE is a relatively new concept that demands that teachers go beyond the boundaries of their traditional subject specialisation. The development of the desired attitudes and skills and the inculcation of EE-related values also require innovative planning and execution of teaching strategies, which demand special skills on the part of teachers. It is, therefore, essential to empower teachers with the desired skills and competencies, which could be accomplished through properly planned training programmes for both pre-service and in-service teachers. At the same time, orientation of other functionaries like headmasters, principals, education officers, and other administrators will also have to be planned to provide support to teachers for the effective transaction of EE. In addition to this, training material for key resource personnel will have to be prepared to conduct in-service training of teachers of different stages of school education and also with different subject backgrounds.

The identification of the content, skills and competencies to be imparted through training programmes, whether pre-service or in-service, at different levels would be one of the prerequisites for their planning and execution. The development of training modules, both in print and non-print modes, and using tools such as computers, databases and Web-based discussion groups, must proceed before initiating training programmes for teachers and functionaries at all levels.

The identification of training needs for different categories of personnel and the development of training modules may be entrusted to institutions like NCERT, SCERTs, teacher educators, teachers, NGOs, and experts from universities/ colleges/research institutions. The possibility of preparing more than one variant and trying them out in schools may be explored in order to evolve the most suitable designs of training modules and modes of training.

4.3.5.2 Training

Training of in-service teachers on a mass scale will have to be undertaken to implement an effective programme of EE in schools. Both contact and distance modes should be utilised for this purpose. The first step would be to create a large pool of key/resource personnel at the national, state and district levels. A detailed plan to evolve such a pool of key resource personnel will have to be worked out, which among other things should also include details about the financial implications and the number and duration of such programmes, and identify the institutions from which the experts could be drawn. The next step, before embarking on the actual training of teachers, would include working out the financial implications, number and duration, content, pedagogical and other academic inputs of the training programmes for different categories of teachers. At the same time, support/training material for the training of teachers through the distance mode will have to be prepared, which could be in print, audio-visual, and digital forms so as to extend the reach.

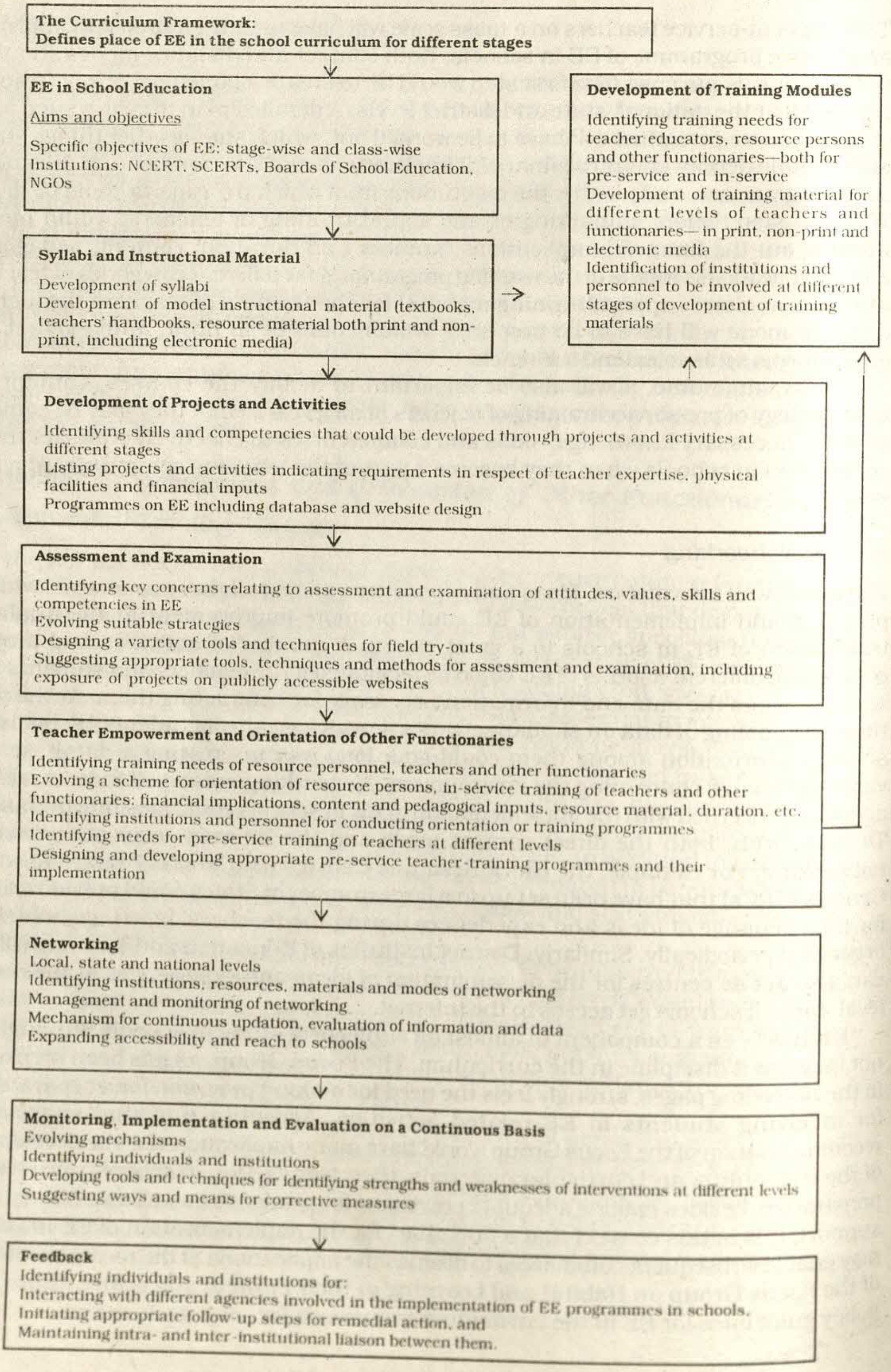
At the same time, it will also be important to modify the courses, content and methodology of pre-service training of teachers at all levels so that they may be equipped with the necessary knowledge, skills and competencies to effectively transact the EE curriculum in schools when they become a part of the teaching community at a later stage.

4.3.5.3 Networking

The free flow of information, ideas and experiences among all those concerned with the planning and implementation of EE could promote improvement in the quality of transaction of EE in schools to a great extent. A number of activities and projects concerning different aspects of EE could be facilitated if the teachers and students have easy access to the data and information necessary for conducting them. At the same time, the pooling of data on similar activities across a group of students/ schools and sharing information among them could go a long way in creating a database on a variety of issues concerning the environment. Networking among all individuals and agencies concerned with the implementation of EE in schools could facilitate this aspect. To begin with, both the direct contact mode and the Internet may be utilised for networking. For example, the Block Resource Centres (BRCs) and Cluster Resource Centres (CRCs) that have been set up in a large number of States could provide a forum for the exchange of ideas and experiences during the teachers' meetings, which are organised periodically. Similarly, District Institutes of Education and Training (DIETs) can also act as centres for the dissemination of ideas and experiences at the district level until all schools get access to the Internet.

EE has been a component of almost all subjects of study in schools although it is not listed as a discipline in the curriculum. The Focus Group, as has been mentioned in the preceding pages, strongly feels the need for making provision for a separate time for involving students in EE-related activities. Acceptance of this suggestion/ recommendation of the Focus Group would have many implications for the development of the curriculum and curricular materials, their transaction in schools, and teacher preparation, besides making adequate provisions for academic as well as administrative support. It is in this context that a flow chart for the implementation of EE in schools may enable subsequent committees to discuss the implications of the recommendations of the Focus Group on Habitat and Learning in their entirety and evolve appropriate policy guidelines for EE in the curriculum framework for school education.

4.4 Flow Chart for Implementation of EE at a Glance



The Curriculum Framework:
Defines place of EE in the school curriculum for different stages

EE in School Education
Aims and objectives
Specific objectives of EE: stage-wise and class-wise
Institutions: NCERT, SCERTs, Boards of School Education, NGOs

Syllabi and Instructional Material
Development of syllabi
Development of model instructional material (textbooks, teachers' handbooks, resource material both print and non-print, including electronic media)

Development of Training Modules
Identifying training needs for teacher educators, resource persons and other functionaries—both for pre-service and in-service
Development of training material for different levels of teachers and functionaries— in print, non-print and electronic media
Identification of institutions and personnel to be involved at different stages of development of training materials

Development of Projects and Activities
Identifying skills and competencies that could be developed through projects and activities at different stages
Listing projects and activities indicating requirements in respect of teacher expertise, physical facilities and financial inputs
Programmes on EE including database and website design

Assessment and Examination
Identifying key concerns relating to assessment and examination of attitudes, values, skills and competencies in EE
Evolving suitable strategies
Designing a variety of tools and techniques for field try-outs
Suggesting appropriate tools, techniques and methods for assessment and examination, including exposure of projects on publicly accessible websites

Teacher Empowerment and Orientation of Other Functionaries
Identifying training needs of resource personnel, teachers and other functionaries
Evolving a scheme for orientation of resource persons, in-service training of teachers and other functionaries: financial implications, content and pedagogical inputs, resource material, duration, etc.
Identifying institutions and personnel for conducting orientation or training programmes
Identifying needs for pre-service training of teachers at different levels
Designing and developing appropriate pre-service teacher-training programmes and their implementation

Networking
Local, state and national levels
Identifying institutions, resources, materials and modes of networking
Management and monitoring of networking
Mechanism for continuous updation, evaluation of information and data
Expanding accessibility and reach to schools

Monitoring, Implementation and Evaluation on a Continuous Basis
Evolving mechanisms
Identifying individuals and institutions
Developing tools and techniques for identifying strengths and weaknesses of interventions at different levels
Suggesting ways and means for corrective measures

Feedback
Identifying individuals and institutions for:
Interacting with different agencies involved in the implementation of EE programmes in schools,
Initiating appropriate follow-up steps for remedial action, and
Maintaining intra- and inter-institutional liaison between them.

The flow chart depicts the chronological order and linkages among the different steps involved and the possible strategies with regard to various issues and problems concerning the implementation of EE in schools.

5 ROAD MAP FOR IMPLEMENTATION

An action plan to implement the proposals sketched above is outlined here. The changes will be such as to be significant in the first year itself but the entire action plan will take five years to implement fully. This action plan takes cognisance of the experiences of the recent few years. In particular, as a part of the 'Environmental Education in the School System' project under the World Bank-supported India Environment Management Capacity-Building Project, greening was done for science, social science and language textbooks of Classes VI, VII and VIII. This was done without changing the larger framework and approach of the existing textbooks. This has been done in 16 states.

The Focus Group suggests that the step-by-step plan should be actually implemented starting in 2005–06. If the implementation were to begin considerably later, then the plan would have to be suitably modified. Education being a subject on the Concurrent List, the Focus Group recommends that the States/UTs should play a major and crucial role in all developmental processes required for implementation as outlined below.

The overall plan for the States/UTs is to:

- Strengthen infusion of EE in all subjects, at all levels;
- Carve out separate time for projects and fieldwork from existing periods of SUPW, science and other subjects;
- Develop tools and techniques for evaluation of projects and fieldwork;
- Revise syllabi, textbooks and other instruction material;
- Merge the separate time, carved out earlier, with the introduction of revised syllabi and textbooks in a phased manner;
- Support these with orientation programmes for various stakeholders;
- Simultaneously, develop the school as a laboratory for EE transaction and, wherever possible, as a resource centre for the community.

5.1 Monitoring

It is suggested that a National Committee to oversee the task of monitoring this action plan may be set up by NCERT. Apart from NCERT representatives, the National Committee should consist of members drawn from other national bodies, representatives of State/UT administrations, NGOs, representatives from school boards and systems, academic institutions and other relevant institutions, and experts.

The action plan consists of five main elements, namely:

- Curriculum review and revision;
- Preparation of educational material;
- Teacher training;
- Examination reform;
- School habitat improvement.

Each of these will have suitable feedback and monitoring mechanisms in place. The feedback mechanisms would include:

- Quantitative data obtained from identified parameters from currently generated

statistical data, and by adding new parameters to be obtained through the statistical information-and-gathering systems of the States/UTs.
- Qualitative and detailed information from pilot projects and benchmarked schools to get a better understanding of what is happening at the field level in terms of the overall goals of bringing EE into the school system.
- Specific studies, to be conducted by NCERT and other institutions and experts, to take up specific tasks and assignments to examine certain key assumptions implicit in the thinking of the new paradigm and the strategies adopted.

It is very important for the governments of States/UTs to take over the ownership of the entire process in their respective territories. A similar mechanism for state-level monitoring committees is recommended.

It is recommended that at the start of this process a workshop be organised with the National Committee and the representatives of the governments of States/UTs, at which all the objectives of the programme can be presented and a detailed plan of monitoring worked out in a participatory way, so that there is ownership of the process. NGO partners, universities and individuals that are likely to play an important part in the development of the materials and the task of monitoring should also be involved.

The National Committee should meet with the state committees periodically to review the programme implementation.

6 CONCLUSION

Taking good care of the human habitat, of the environment that nurtures us, is emerging as one of the most significant concerns of the new millennium. As humanity endeavours to move onto a path of sustainable development, even as it enters the Information Age, it is evident that we need a new paradigm for education. EE is ideally placed to serve as the lever for this paradigm shift, which would emphasise:
- Learning rather than teaching;
- Building capacity for critical thinking and problem solving;
- Locale specificity in the context of a global vision;
- Multidisciplinary approach;
- Participatory efforts;
- Knowledge generation;
- Sensitivity to diversity, equity, gender;
- Empowerment, rather than indoctrination.

Of course, working towards such a paradigm shift is a major challenge and the Focus Group recommends that we do so through efforts in six major areas:
- Curricula revision;
- Materials development: conventional media;
- Taking advantage of ICT;
- Teacher preparation;
- Evaluation system;
- The school habitat.

The Group has also sketched a road map for organising this effort over a period of five years, beginning serious work from the first year onwards. We recognise that the judgment of the Hon'ble Supreme Court emphasising the necessity of teaching environmental studies as a compulsory subject at all stages underscores the significance

Syllabus	Year 1	Year 2	Year 3	Year 4	Year 5
Textbooks	Revision of syllabus for primary stage	Revision of syllabus for upper primary stage	Revision of syllabus for secondary stage	Revision of syllabus for senior secondary stage	
	Initiate revision of primary stage textbooks; Introduce activities and projects to strengthen EE at all stages	Implement revised textbooks for primary stage; Initiate revision of upper primary stage textbooks	Implement revised textbooks for upper primary stage; Initiate revision of secondary stage textbooks	Implement revised textbooks for secondary stage; Initiate revision of senior secondary stage textbooks	Implement revised textbooks for senior secondary stage
Time and space	Carve out a separate period for activities and projects from the existing schedulefor SUPW, science and other subjects for all stages	Conduct activities and projects for primary stage as per revised textbooks	Merge back activity period at the primar level;Conduct activities and projects for upper primary stage as per revised textbooks	Merge back activity period at the upper primar stage;Conduct activities and projects for secondary stage as per revised textbooks	Merge back activity period at the secondary stage;Conduct activities and projects for senior secondary stage as per revised textbooks
Teachers' Material	Develop teachers' manuals for activities and projects to be done in separate period for primary stage;Develop teachers' manuals for revised textbooks for primary stage;Support material (print, AV); Initiate development of computer and Web-based material	Develop teachers' manuals for activities and projects to be done in separate period for upper primary stage;Develop teachers' manuals for revised textbooks for upper primary stage; Support material (print, AV);Continue development of computer and Web-based material	Develop teachers' manuals for activities and projects to be done in separate period for secondary stage;Develop teachers' manuals for revised textbooks for secondary stage; Support material (print, AV);Continue development of computer and Web-based material	Develop teachers' manuals for activities and projects to be done in separate period for senior secondary stage;Develop teachers' manuals for revised textbooks for senior secondary stage; Support material (print, AV); Continue development of computer and Web-based material	

Orientation	Orientation of education administrators, curriculum developers, textbook writers, master trainers, teachers and concerned NGOs and academics for understanding short- and long-term plans	Orientation of teachers for revised textbooks for primary stage	Orientation of teachers for revised textbooks for upper primary stage	Orientation of teachers for revised textbooks for secondary stage	Orientation of teachers for revised textbooks for senior secondary stage
Evaluation system	Formation of expert groups for developing new system of evaluation for primary stage	Implementation of new system of evaluation for primary stage;Formation of expert groups for developing new system of evaluation for upper primary stage	Implementation of new system of evaluation for upper primary stage;Formation of expert groups for developing new system of evaluation for secondary stage	Implementation of new system of evaluation for secondary stage; Formation of expert groups for developing new system of evaluation for senior secondary stage	Implementation of new system of evaluation for senior secondary stage
School as habitat	Expert groups at regional and national levels on compiling ideas for 'School as habitat' concept	Pilot implementation of 'School as habitat' concept at a few sites	Learning from 'School as habitat' concept: Pilot testing and planning for second phase of 'School as habitat' in some states	Learning from 'School as habitat' concept: Second phase and planning for state-level 'School as habitat' in all states	Implementation of 'School as habitat' concept

of the concerns addressed by our Group, and is an important impetus towards achieving the required changes. The Group sincerely believe that if our recommendations are accepted, the resulting actions would follow the Hon'ble Supreme Court judgment in letter as well as in spirit.

7 APPENDICES

7.1 Basket of Activities

Activities dealing with the physical, biological as well as the social environment, both natural and modified by humans to varying degrees, would be at the heart of learning about the habitat. This is a theme that touches upon all aspects of life; hence EE can, and should, permeate every discipline being taught in the schools. This is why we strongly recommend that EE should infuse all disciplines as an activity-oriented endeavour. This would serve far better than teaching it as a separate subject in the conventional bookish fashion. We provide here some idea of the rich diversity of themes that may be addressed by such activities.

7.1.1 *Physics*

The Indian economy is said to be a gamble on the monsoon rains, which are a matter of perennial fascination to all Indians. This rainfall exhibits intricate variation over space and time. Excellent data on such variation are available and can be used to promote many interesting activities in physics and mathematics. Thus, the ascent of moisture-laden monsoon winds over the Western Ghats and the Khasi Hills results in some of the highest levels of rainfall anywhere in the world. Equally remarkably, there are areas of very low rainfall in the lee of the hills. Simple experiments may be devised to visualise patterns of flow of fluids over uneven topography, as well as to demonstrate how the ascent of air leads to cooling and precipitation, and descent to the opposite effects.

7.1.2 *Mathematics*

There is a widespread feeling that recent years have witnessed a decline in rainfall over India. However, the data collected over the last hundred odd years at several hundred stations across India do not seem to substantiate this belief. A careful analysis of this data set provides excellent possibilities for projects relating to data representation, visualisation and interpretation.

7.1.3 *Computer science*

There is little good-quality data available today on many facets of India's environment, such as the depth of underground water tables, and it is feasible to create such documentation on the basis of student projects. It would be possible to upload the results of such projects on a publicly accessible website, thereby creating a transparent and comprehensive database on India's environment. By inviting not only experts but also all interested citizens to assess the quality of such projects and augment their results, a self-correcting system could be set up that would lead to an organic growth of our understanding of the Indian environmental scenario and concrete ways of undertaking positive action. Many interesting computer science projects may be designed around the endeavour of setting up such a database and a website.

7.1.4 *Chemistry*

Effluents from sewage-treatment plants are widely available throughout the country. They would provide excellent raw material for a variety of chemistry projects.

7.1.5 *Biology*

The recently passed Biological Diversity Act, 2002 aims to promote the conservation, sustainable use and equitable sharing of benefits of India's biodiversity resources, including habitats, cultivars, domesticated stocks and breeds of animals and micro-organisms. With these goals in view, the Act provides for the establishment of a National Biodiversity Authority (NBA), State Biodiversity Boards (SBBs), and Biodiversity Management Committees (BMCs) at the level of panchayats, municipalities and city corporations. Most significantly, BMCs would serve to take science right down to the grass roots since the rules lay down that, "The main function of the BMC is to prepare a People's Biodiversity Register in consultation with local people. The Register shall contain comprehensive information on availability and knowledge of local biological resources, their medicinal or any other use or any other traditional knowledge associated with them." Throughout the country, then, schools could work with local panchayats or municipalities to document biodiversity resources and associated knowledge. This could be accomplished on the basis of a variety of school projects addressing specific issues of interest, such as the occurrence and utilisation of medicinal plants or the protection of rare and endangered fish in a water body protected on grounds of religious beliefs as a sacred pool.

7.1.6 *Geography*

Most people greatly enjoy being involved in an exercise of preparing a map of their immediate environment. People have an intuitive mental picture of the landscape of their surroundings, including the relative extent and interrelations of the various elements in the landscape. People also have locally prevalent terms for many individual elements as well as generic terms for ecosystem types. Thus, Janaicha (=Janai's) rahat (=sacred grove), Saheb (=Sahib's) dongar (=hill), Chavdar (=Tasty) tale (=lake). The map need not be drawn on paper; it may begin as a model on the ground using pebbles, stones and rangoli to depict various features. The map does not have to be to scale; it should, however, correctly depict the overall shape, relative extent and position of the different elements of the landscape. These elements may be labelled in terms of scientific categories such as degraded deciduous forest as well as the locally used name for that patch. These maps may be overlaid with a number of themes such as depth of the underground water table, spread of flood water, frequency of landslides, frequency of traffic accidents, or incidence of cases of malaria. Additionally, the documentation of these local names of habitats could be an interesting exercise in the study of languages.

7.1.7 *History*

Several weeds today dominate India's landscape. These include eupatorium in humid forests, parthenium in drier tracts, ipomoea in waterlogged areas, and water hyacinth in rivers and lakes. Their history deserves to be carefully documented and related to other changes such as overexploitation of land and opening up of the forest canopy, or nutrient enrichment of freshwater bodies. Little documentary evidence of such changes exists, but they could be reconstructed from oral histories gathered through interviews conducted as student projects. When put together, these would constitute a very worthwhile contribution to documenting India's environmental history.

7.1.8 *Political science*

Water is becoming an increasingly scarce resource all over India. Conflicts over water are seen at various levels. Such conflicts display many dimensions pertaining to issues of equity and gender. At the level of households, conflicts may occur over division of labour in terms of the effort expended in fetching water in households without access to piped water. At the level of local communities, they may be witnessed as queues at public water taps or water tankers, or as conflicts over use of groundwater resources. Consider as an example the use of groundwater in the coastal tracts of the Uttara Kannada district of Karnataka. Traditionally, the crops of this region include rice (largely cultivated by smallholders) and betel nut, primarily cultivated by richer orchard owners. When, fifty years ago, there were no electrified pump sets, the water table was at a depth of about five metres, and the smallholders were able to hand irrigate and raise a second crop of rice in the winter. Following rural electrification, free power was made available to farmers along with subsidised pump sets. These facilities were primarily availed of by the orchard owners, who began to extensively irrigate betel nut in the dry season, substantially increasing its yields. But this drove the water table down. As a result, the smallholders could no longer raise a second rice crop. This has compelled their women to switch to the sale of fuelwood as a livelihood activity in the dry season, resulting in extensive conflicts with forest authorities and the degradation of forests at a rapid pace. At the level of municipalities and panchayats, conflicts over water manifest themselves as protests against the pollution of river water sources used by villagers by sewage from cities. Then there are interstate disputes such as that over the Kaveri waters between Karnataka and Tamil Nadu, and international disputes such as that over the Indus water resources between India and Pakistan. A variety of activities and projects could address such political issues.

7.1.9 *Languages*

India's Biological Diversity Act mandates the establishment of Biodiversity Management Committees (BMCs) at the level of panchayats, municipalities and city corporations throughout the country. The main function of the BMC is to prepare a People's Biodiversity Register in consultation with the local people. This Register is expected to contain comprehensive information on the availability and knowledge of local biological resources, their medicinal or any other use, or any other traditional knowledge associated with them. Much of this information lies with the people living close to the grass roots and is expressed in words that are often unknown in the literary tradition of the various Indian languages. Such information may also be expressed in tribal languages such as Gondi, Santhali, Kuki or Kinnauri. Students may be profitably involved in projects relating to material that would contribute to the local People's Biodiversity Register. While recording knowledge associated with biodiversity resources for this purpose, they may be encouraged to learn of many new facets of language.

7.1.10 *Music*

Much of people's understanding of biodiversity is expressed through songs and dances. Recording such knowledge is part of the mandate of preparation of People's Biodiversity

Registers under the Biological Diversity Act, and students may fruitfully be involved in projects that would contribute to the preparation of these Registers. Consider an example from the Gond village of Mendha-Lekha in eastern Maharashtra. A traditional women's song of this village describes the swimming patterns of the different species of fish migrating upstream for spawning during the monsoon. This song is a component of folk music; it also contains information on fish behaviour not recorded so far in the scientific literature.

7.1.11 Art

Much of people's understanding of biodiversity is expressed through art forms. Recording such knowledge is part of the mandate of preparation of People's Biodiversity Registers under the Biological Diversity Act, and students may fruitfully be involved in projects that would contribute to the preparation of these Registers. Consider an example from the Gond village of Mendha-Lekha in eastern Maharashtra. The Gonds erect a wooden wedding pillar at the time of every wedding. Figures of many animals are carved on this pillar, not just large animals like deer, but even smaller animals like scorpions.

7.1.12 Craft

Much of people's use of the various resources offered by biodiversity is related to their crafts. Recording such uses is part of the mandate of preparation of People's Biodiversity Registers under the Biological Diversity Act, and students may fruitfully be involved in projects that would contribute to the preparation of these Registers. Consider an example from the Uttara Kannada district of Karnataka. Here one of the artisanal communities specialises in the fabrication of headgear for brides and bridegrooms from ischioneme, a plant growing on the banks of ponds. The livelihood of this community is being threatened by the destruction of the ischioneme habitat by the encroachment of agriculture on the margins of irrigation ponds.

7.1.13 Scheduled castes/tribes issues

Much of people's understanding of biodiversity lies with members of Scheduled Caste/ Scheduled Tribe communities since these people often depend on natural biodiversity resources to sustain their livelihoods. Recording such knowledge is part of the mandate of preparation of People's Biodiversity Registers under the Biological Diversity Act, and students may fruitfully be involved in projects that would contribute to the preparation of these Registers. Consider as an example the knowledge of the Phasepardhis, a semi-nomadic hunting-gathering community living in the dry tracts of Maharashtra. Since these people have been engaged in trapping birds for generations, they have a profound knowledge of the bird communities of their region. Such knowledge includes details of territorial behaviour not recorded so far in the scientific literature.

7.1.14 Health

Many landless agricultural labourer and tribal communities depend on wild plants to provide important nutritional supplements to their diet. These include several species of green leafy vegetables that are otherwise considered agricultural weeds. Projects assessing the nutritional role of such plants may be worthwhile components of health education.

7.1.15 *Work experience*

Malaria remains a major scourge in many parts of India even as mosquito vectors evolve resistance to chemical methods of control. Environmental management must, therefore, become an increasingly significant component of efforts aimed at the eradication of this disease. Such environmental management activities, for example, the draining or covering up of stagnant water pools, could be very worthwhile components of work experience in the schools.

7.1.16 *Physical education*

Active exploration of the local environment is an important component of EE and can, with profit, be linked to physical education. For example, tree-climbing skills could be made a part of physical education and used in projects exploring associates of trees such as lichens, orchids, strangling figs, or parasitic mistletoes.

7.1.17 *Gender*

All school learning is related in one way or the other to the environment. Learning about our environment is incomplete without the inclusion in the curriculum of references to the active role played by women in its sustenance and nurturance. Historically, women have had a close relationship with the environment. For instance, in hunting-gathering societies, food gathering and foraging was the work of women. As a result, women are more likely to have made observations of plant behaviour, and through a process of trial and error made the momentous discovery of agriculture.

In India, rural women were at the forefront of the Chipko movement, an environmental and social movement in northern India in the 1970s that is often cited as an example of successful grass-roots activism. The movement involved satyagraha, or non-violent resistance, wherein the women hugged trees and stood between the trees and the contractors' axes. This movement led to changes in the natural resource policy of India.

Women play an important role as users and managers of forest resources (collecting fuel, fodder, forest products, and providing labour in forest industries ranging from nurseries to plantations). In the non-forest scenario, in rural India women are intimately connected with the five f's: food, fuel, fodder, fertiliser, and fibre (herbs). Women and girls everywhere are deeply involved in the use of natural resources for their livelihood and survival. They thus have empirical knowledge of natural resources that must find a legitimate place in school learning.

While environmental concerns have entered the school curriculum, they need to address the relationship of women to natural resources and not treat these concerns in a gender-neutral manner. EE also needs to address the fact that the impact of environmental change is different for men and women; it varies with the local social structure; it depends on gender divisions of labour, income and responsibilities; and it is affected by unequal access to and control of resources.

India's Biological Diversity Act mandates the establishment of Biodiversity Management Committees (BMCs) at the level of panchayats, municipalities and city corporations throughout the country. The main function of the BMC is to prepare a People's Biodiversity Register in consultation with the local people. This Register is expected to contain comprehensive information on the availability and knowledge of local biological resources, their medicinal or any other use, or any other traditional knowledge associated with them. Recording such knowledge is part of the mandate of preparation of People's Biodiversity Registers, and students may fruitfully be involved in projects that would contribute to the preparation of these Registers.

Consider an example from the Gond village of Mendha-Lekha in eastern Maharashtra. There are significant differences in the knowledge associated with biodiversity amongst the men and women of this village. For instance, women are far more knowledgeable about wild food plants, especially those producing tubers, and fish, while men know much more about birds and mammals.

7.2 The Supreme Court Order and its Implications

In response to the writ petition No. 860/1991 by Shri M.C. Mehta, the Hon'ble Supreme Court said in its order dated 22 November 1991:

> We accept on principle that through the medium of education, awareness of the environment and its problems related to pollution should be taught as a compulsory subject.

This recognises the significance of environmental concerns in humanity's pursuit of sustainable development the world over. This is, of course, of special concern in a country like India where a substantial proportion of people are dependent on environmental resources to sustain their livelihoods. The Group feels that this is best accomplished by infusing the teaching of EE as a part of different disciplines while ensuring that adequate time is earmarked for pertinent activities. We have attempted to sketch a road map to accomplish this goal, and believe that if our recommendations are accepted, the resulting actions would follow the Supreme Court judgment both in letter as well as in spirit.

On 18 December 2003, the Hon'ble Supreme Court further ordered, "We also direct the NCERT . . . to prepare a module (model) syllabus", and on 13 July 2004 it directed that "the syllabus prepared by the NCERT for Class I to XII shall be adopted by every state in their respective schools". It further directed that "the NCERT be appointed as a nodal agency to supervise the implementation of this Court's order". Our recommendations also include a plan of action for the implementation of EE, which has an inbuilt mechanism for monitoring at every stage as well as at the State/UT and national levels. The road map involves the following five elements:

- Curriculum review and revision;
- Preparation of educational material;
- Teacher training;
- Examination reform;
- School habitat improvement.

8 READING LIST

1. Agarwal, Anil et al. *State of India's Environment: First Citizens' Report* (1982) and *State of India's Environment: Second Citizens' Report* (1984–85). Centre for Science and Environment, New Delhi.
2. Gadgil, Madhav and Ram Guha. 1996. *Ecology and Equity: The Use and Abuse of Nature in Contemporary India.* Penguin Books India, New Delhi.
3. Gadgil, Madhav and Ram Guha. 1994. *This Fissured Land: An Ecological History of India.* Oxford University Press, New Delhi.

8.1 Publishers of Material for Young Readers

1. National Book Trust
   A 5 Green Park New Delhi 110016
2. Children's Book TrustNehru House
   4 Bahadur Shah Zafar Marg
   New Delhi 110002
3. Centre for Environment·Education
   Thaltej Tekra Ahmedabad 380054
4. Centre for Science and Environment
   41 Tughlakabad Institutional Area
   New Delhi 110062
5. CPR Environmental Education
   Centre1 Eldams RoadChennai 600018
6. Eklavya
   E-1/25, Arera Colony
   Bhopal 462016
7. Publications Division
   Ministry of Information and Broadcasting
   Patiala House New Delhi 110001

8.2 Useful Reference Books and Other Material for Young Readers

- NCERT, New Delhi (mimeo)
- M. Chandra. *Greenhouse Effect and Global Warming.*
- M. Chandra. *Acid Rain.*
- M. Chandra. *Heavy Metal Pollution.*
- M. Chandra. *Inorganic Fibres.*
- V.P. Srivastava, R. Joshi, and M. Chandra. *Environmental Education: Issues and Concerns.*

- *Bombay Natural History Society, Mumbai*

- S. Ali. 1996. *The Book of Indian Birds* (12th and enlarged centenary edition). BNHS and Oxford University Press, New Delhi.
- J.C. Daniel. 2003. *The Book of Indian Reptiles and Amphibians.* BNHS and Oxford University Press, New Delhi.

- S.H. Prater. 1971. *The Book of Indian Animals.* 3rd edition. BNHS.
- R.E. Hawkins (ed.). 1986. *Encyclopaedia of Indian Natural History*: Centenary Publication of the Bombay Natural History 1883–1983. Oxford University Press, Bombay.
- Ethelbert Blatter and W.S. Millard. 1977. 2nd edition reprint. *Some Beautiful Indian Trees.* BNHS.
- Romulus Whitaker. 1978. *Common Indian Snakes: A Field Guide.* Macmillan Co. of India Ltd., Bombay.

Charles McCann. *Trees of India: A Popular Handbook.* Periodical Expert Book Agency, Delhi.

- P.V. Bole and Yogini Vaghani. 1986. *Field Guide to the Common Trees of India.* Oxford: Oxford University Press for World Wildlife Fund, New Delhi.

Pippa Mukherjee. 1983. *Common Trees of India.* Oxford University Press, New Delhi.

- Suresh Vaidyarajan and Arvind Gupta; Illustrations by Avinash Deshpande. *Pumps from the Dump.*

The whole world is a garbage pit; Collect some junk and make a kit.

- Bikram Grewal. 2000. *Birds of the Indian Subcontinent.* Local Colour, Hong Kong.

Vivek Menon. 2003. *A Field Guide to Indian Mammals.* Dorling Kindersley for Penguin Books, New Delhi.

Books by Ruskin Bond have been published by Penguin Books India, New Delhi and Rupa & Co., New Delhi.

Books by Jim Corbett have been published by Oxford University Press, New Delhi.

Centre for Science and Environment, New Delhi

- *State of India's Environment: Citizens' Report* series
- Anil Agarwal and Sunita Narain. 1997. *Dying Wisdom: Rise, Fall and Potential of India's Traditional Water Harvesting Systems.* This volume is one of the biggest efforts in recent decades to comprehensively document India's millennia-old wisdom in water management. This influential book, released in 11 regions across India, triggered a nationwide interest in community-based water-management systems.
- *State of India's Environment: Fifth Citizens' Report.* 1999.
- A comprehensive two-volume dossier on environmental issues, events, policies and practices in India, along with statistics on environment-related facts.
- *Gobar Times*

Bimonthly magazine for children.

Bharati Vidyapeeth Institute for Environment Education and Research (BVIEER), Pune

- *Booklet on Forest Ecosystem.* English, Marathi.
- *Booklet on Grassland Ecosystem.* English, Marathi.
- *Booklet on Aquatic Ecosystem.* English, Marathi.
- *Activity Book: Explore Your Forest.* English.
- *Activity Book: Explore Your Grassland.* English.
- Flip charts on birds. English, Hindi.
- Flip charts on mammals. English, Hindi.
- Game on 'The Tree as an Ecosystem'. English, Hindi.

Books and Other Material for Children from CEE

- *Nature Scope Series: Amazing Mammals; Birds, Birds, Birds; Incredible Insects; Endangered Elephants.*
- *Turtles in Trouble* (five titles published so far). Richly illustrated manuals containing information and activity ideas.
- *Water Conservation Game.* A richly illustrated and colourful game in a poster form, which sensitises children to appropriate water use.
- *Ropes and Ladders.* A board game that gives practical tips on how every one of us can become more environmentally friendly by our actions in our daily lives. English, Marathi.
- *Where's Away?* On the waste trail using a story format involving two creatures, Worryworm and Litterbug, to explore what happens to the garbage we throw out. This colourfully illustrated book also offers information, games, activities, etc.
- *ABC Naturally!* Using verses, the book stresses the importance of various natural resources in a simple way, and also discusses the impact of human activities on these resources. It has been illustrated by child artists, and also suggests various activities.
- *Forest Tales.* The book uses folk tales from the South Asia region to highlight environmental ethics, especially in relation to forests and forest dwellers.
- *Puzzling Out Pollution.* This book combines information, stories, puzzles, games, and activities to make children aware of the various dimensions of the problems of pollution.
- *Oceans Omnibus.* This richly illustrated and colourful book for children and young people provides general information, specific facts, maps, etc. on the different dimensions of the subject with special reference to the seas around India. It includes four handy charts. Each chart discusses one theme: Our Coastal Heritage; Threats to Our Oceans; Fauna of Our Oceans; and Shells. Both sides of the chart are used to give detailed information about these issues.
- *Storm Over Silent Valley.* This is the story of the battle to save one of the last remaining pockets of pristine rainforest in Kerala. The book is written by the well-known environmentalist Darryl D'Monte. It includes colour plates and illustrations that bring alive the unique beauty of the forest. The book is suitable for young people and all those who would like to know more about this landmark case.
- *Exploring the River Front of My Town.* A central concern of educationists is how best they can equip the child with skills appropriate for a rapidly changing world. For the urban child, the 'environment' is an alien concept invoking mainly pretty trees and tigers. How the child is linked to the entire environment and is affected by the rapid changes in the macro environment is a concept that the student finds difficult to understand or experience. This publication deals with some interesting experiences of the changing urban environment, written in a lucid fashion with appropriate and imaginative illustrations.
- *Nature Observation* series: This series has been developed to guide children in the systematic observation of the plants and animals around them. The titles include:
  - *Pakshi Nirikshan Pustika* (original in Hindi and Marathi, Assamese, Khasi, Mizo editions)
  - *Standhary Parichay Pustika* (Hindi)
  - *Vanaspati Nirikshan Pustika* (Hindi)
  - *Aksheruki Prani Parichay Pustika* (Hindi)

- *I am a Tree*. A touching poem about how much a tree gives, and how little humans care. Simple verses and imaginative illustrations combine to make it appealing to both young and old readers. Also suitable for dramatisation. English, Hindi and Gujarati.
- *Nature File* series: *Ant, Ozone, Grasses.* Booklets containing information and facts.
- *Walking the Wild Path.* This book describes what has inspired people to take up wildlife-related careers. Some of India's leading wildlife experts and some dedicated youngsters who made up their minds to work in the field of wildlife conservation have contributed to this exciting and adventure-filled volume for young people. English.
- *Elephantasy.* All about the Asian elephant. Using stories, articles, proverbs, etc. the book attempts to create a feeling of compassion and affection for the elephant. Each story is followed by some interesting information about elephants that relates to the theme of the story as well as some ideas for doing, making, and sharing elephant-related things. English.
- *Wild Dreams, Green Screens.* The book consists of articles written by eminent wildlife film-makers. It may inspire young readers to embark upon adventurous journeys of their own and also try their hand at wildlife photography. English.
- Books on birds in Gujarati: *Aas Pas na Pankhi; Pani na Sangathi; Vid Vagada na Pankhi; Van Upavan na Pankhi.*

Tulika Publishers

13, Prithvi Avenue (First Floor)
Abhiramapuram
Chennai 600018
Phone (44) 24981639, 24671117
tulikabooks@vsnl.com

Many of Tulika's books can be used as supplementary texts in schools for various subjects:

- Priya Krishnan. Art Uma Krishnaswamy. 2002. *The Story of Ganga.*
- Priya Krishnan. Art Uma Krishnaswamy. 2002. *The Story of Narmada.*
- Priya Krishnan. Art Uma Krishnaswamy. 2002. *The Story of Brahmaputra.*
- Priya Krishnan. Art Ashok Rajagopalan. 2002. *The Story of Kaveri.*
- R. Rao and Sandhya Rao. 1998. *Suresh and the Sea.*
- Samina Mishra. 2000. *Hina and the Old City.*
- Mahashweta Devi. *The Why-Why Girl.*

Tara Publishing

35, 28th Cross Street
Indira Nagar
Adyar
Chennai 600 020
http://www.tarabooks.com/

Some books from Tara:

- Sirish Rao. 1998. *Leaf Life.*
- Anushka Ravishankar and Pulak Biswas. 2004. *Tiger on a Tree.*
- Gita Wolf and Anushka Ravishankar, Illustrated by Orijit Sen. 1999. *Trash! On*

Ragpicker Children and Recycling.

- *Trash!* is a unique combination of fact and fiction. Based on the real-life experiences of ragpicker children, it tells the story of Velu, a runaway child from a village.
- Sudarshan Khanna, Gita Wolf and Anushka Ravishankar. 2000. *Toys and Tales with Everyday Materials.* Tara Publishing and National Institute of Design, Ahmedabad.
- This book deals with toy making at many levels. It addresses three age groups—children, teenagers and adults—at various levels of complexity.

8.3 Publishers of Teachers' Material on the Environment

1. *Centre for Environment Education*
   (CEE)Thaltej Tekra Ahmedabad 380054
2. *CPR Environment Education Centre1*
   Eldams Road Chennai 600018
3. *World Wildlife Fund, India*
   172 B Lodi Estate New Delhi 110003
4. *National Museum of Natural History*
   Barakhamba Road
   New Delhi 110001
5. *Centre for Cultural Resources and Training (CCRT)*
   Bhawalpur House Bhagwandas Road
   New Delhi 110001
6. *National Council of Educational Research and Training (NCERT)*
   Sri Aurobindo Marg
   New Delhi 110016
7. *Central Institute of Educational Technology (CIET)*
   NCERT Chacha Nehru Bhawan
   Sri Aurobindo Marg New Delhi 110016
8. *Bharati Vidyapeeth Institute of Environment Education and Research (BVIEER)*
   Pune Satara Road Dhankawadi
   Pune 411043
9. *Creative Learning for Change*
   S 268 Greater Kailash II
   New Delhi 110048
10. *Uttarakhand Seva Hindi*
    Champa Nala Manorath Sadan
    Almora 263601
11. *Kalpavriksh*
    5 Shree Duttakrupa
    908 Deccan GymkhanaPune 411004

8.4 Books and Other Material for Teachers

- Cathy Spagnoli. 2003. *The World of Indian Stories: A teaching resource of folktales from every state*, with illustrations by N. Bindhu Malini. Tulika Publishers, 13 Prithvi Avenue (First Floor), Abhiramapuram, Chennai 600018.

BVIEER, Pune

- *Handbook on Environment Education for Teachers from Std. V to Std. IX: Maharashtra Syllabus*. English, Marathi.
- *Handbook for Teachers on Environment Education*. Hindi.
- *Handbook for Ecosystem Interpretation*. English.

CEE, Ahmedabad

- *Joy of Learning I, II, III*. A set of three handbooks describing more than 150 activities to help children understand different facets of the environment, developed for NCERT. Each activity is presented in a user-friendly format with suggestions as to the subjects in which the activity can be introduced; variations/ extensions; ideas for evaluation, etc. English, Tamil, Telugu, Bengali, Marathi.
- *Exploring a Tree*. This manual for teachers of Classes V–VIII will help them carry out an outdoor activity-based programme with their students. The activities in the manual will help teachers create awareness about how a tree is important to a variety of living things on and around it. It explains how a tree is a microhabitat by itself while also being part of the larger environment. English, Gujarati.
- *Water Quality Monitoring in Schools*. This manual can be used as a guide to river water quality monitoring in a laboratory.
- *Ozone Eleven*. This book examines some of the key questions that may be asked by those who want an introduction to ozone depletion and answers some of these basic questions in a simple way.
- *Design a Playground*. India has a rich and varied play tradition. With rapid urbanisation, formal playgrounds have been pushed into the background. This little publication of 39 pages offers creative ideas for designing a playground, including designs for equipment. It shows how one can transform open spaces into exciting natural spaces for learning and playing. Useful for schools, colleges, and housing societies.
- *Approaches to Environmental Education*. This is a compilation of a set of working papers based on an instructional technologies workshop held for a nationwide teacher-training programme. It offers a variety of methods that may be effectively used at the school level. These methods include camping and excursions, neighbourhood field trips, observation of the world around us, observation and measurement, and a lot more. Hindi.
- *Environmental Orientation to School Education*. Environmental Orientation to School Education (EOSE) is a programme of the Ministry of Human Resource Development. This publication describes some of the experiences and learnings in working with this programme. It also gives details on developing proposals and includes some interesting case studies. It also deals with some technical aspects for developing EE material. English.
- *The Green Teacher*. The package includes a video demonstrating different EE approaches and a manual. The manual discusses experiences and case studies

providing insights to help incorporate EE in school education. The video demonstrates some of the active approaches to teaching and learning about the environment. This package is useful for orienting pre-service and in-service teachers.

- *The Green Club.* A guide to setting up and running clubs dealing with the environment. Addressed to teachers, leaders and organisers of eco clubs, nature clubs and other action groups, this manual discusses ideas on forming and running green clubs, organising support for them, organising and planning activities and projects, etc.
- *The Green Action Guide.* A manual for planning and managing environmental improvement projects. It discusses the what, why and how of school action projects for environmental improvement. It presents some ideas for action projects that teachers can carry out with their students. The manual has been developed with support from the Ministry of Human Resource Development.
- *Green Reader.* The book is an introduction to environmental concerns and issues and forms part of the Green School Series. The 10 chapters—on ecology and biodiversity, agriculture, energy, climate change and ozone depletion, urbanisation, industry and environment, pollution, population, consumption and environment, and environment and development—have all been reviewed and commented upon by experts in their respective fields. English, Marathi.
- *Wild at the Zoo.* This information-and-activity manual on educational opportunities at the zoo offers ideas for making a visit to the zoo more exciting and educational. It comprises three sections, viz., Understanding a Zoo, Worksheets, and Activities. Each worksheet and activity is accompanied by a note that provides background information about the topic it covers. An educator can use these facilities to plan and create teaching-learning experiences. Prototype worksheets on different themes can be used to note guided observations while visiting a zoo. The activities described are those that can be carried out by the educator before, during, or after a visit to the zoo. The manual has been developed with support from the Ministry of Human Resource Development. English, Marathi.
- *Energy Matters.* This teacher's guide suggests activities designed to sensitise students about various aspects of environmental issues so that when they grow up they can take decisions while factoring in concerns about environmental sustainability. The book helps lay the foundation for a lifestyle that is environment friendly. English.
- *Garbage to Gardens.* This activity booklet on solid-waste management for schools suggests various methods that may be employed to communicate concepts about waste management to children. It will help teachers to lead students in learning about and understanding the problem of garbage and then taking action to deal with it.
- *Water Package.* This package, for use by teachers of Classes V–VII, consists of 16 information cards on various aspects of water; an activity booklet that suggests 12 interesting classroom activities on the theme; a colourful classroom poster; and two sheets and 36 colourful labels for students. The package has been used for nationwide teacher training programmes under the National Environmental Awareness Campaign (NEAC) of the Ministry of Environment and Forests.
- *Conserving our Water Resources* (booklet). This handbook on EE activities for teachers of Classes V–VIII explains the need to conserve water resources. Developed along the lines of (a) importance of water; (b) uses of water; (c) water storage; (d) water quality; and (e) reuse of waste water (recycling of water), the publication

attempts to integrate these five dimensions in an interesting and informative manner.

- *Green Games Manual.* This book describes the games developed by CEE, and also popular games adapted by CEE, to suit the Indian context. These games can be used for different groups, ranging from school and college students to NGOs. English, Marathi.
- *Cleaner World: A Question of Civic Sense.* This handbook on solid-waste management is addressed to the youth and provides useful ideas and experiences for individuals, youth organisations, and anybody who cares to make a difference. The first section deals with information on waste management and the second section offers ideas about activities and projects that young people can take up to participate in environmental conservation.
- *Essential Learnings in Environmental Education.* This database of 635 statements provides the framework of what constitutes environmental literacy. Useful for educators, particularly those involved in developing EE programmes, materials, curricula, textbooks, etc. Developed as part of an Indo-US collaborative project.
- *Exploring the River Front of My Town.* A central concern of educationists is how best they can equip the child with skills appropriate to deal with a rapidly changing world. For the urban child, the 'environment' is an alien concept invoking images mainly of pretty trees and tigers. How the child is linked to the entire environment, and how he or she is affected by rapid changes in the macro environment, is a concept that the student finds difficult to understand or experience. This publication deals with some interesting experiences of the changing urban environment. It is written in a lucid fashion with appropriate and imaginative illustrations.

8.5 Material for Undergraduates

BVIEER, Pune. 2004. *Biodiversity of India.* CD-ROM for the compulsory core module of environment studies for undergraduate courses. English.

BVIEER, Pune. 2004. *Textbook on Environment Studies*, for UGC, for all branches of higher education. English.

Kiran Chhokar, Mamata Pandya, Meena Raghunathan (eds.). 2004. Centre for Environment Education. *Understanding Environment.* Sage Publications Pvt. Ltd. New Delhi.

Display Material

CEE, Ahmedabad

Act Now Package (Set of 9 Posters). This set of colour posters, aimed at an urban audience, discusses what a city gives us, the environmental impact of excessive use of electricity, water, etc., and, most importantly, what each individual can do to improve the environment. The accompanying booklet in English is a guide to using the posters as a framework to set up a full-fledged exhibition, which may include other models, exhibits, etc., as well as ideas to make the exhibition more effective. English. A textless version of the posters is also available. Local-language versions can be created by writing the text in the desired language in the spaces provided in the posters from an accompanying pamphlet that provides the text.

- *Floods and Droughts*

Package (Set of 11 Posters). This set of two-colour posters deals with the Indian monsoons, describes floods and droughts, discusses why they occur, and suggests what we can do to control soil erosion, conserve water, and take up greening activities. Suitable for school and community exhibitions. English, Hindi.

ARTS, MUSIC, DANCE AND THEATRE

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New Delhi – 110 016

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EXECUTIVE SUMMARY

The need to integrate art education in the formal schooling of our students now requires urgent attention if we are to retain our Unique cultural identity in all its diversity and richness. For decades now, the need to integrate arts in the education system has been repeatedly debated, discussed and recommended and yet, today we stand at a point in time when we face the danger of losing our unique cultural identity. One of the reasons for this is the growing distance between the arts and the people at large. Far from encouraging the pursuit of arts, our education system has steadily discouraged young students and creative minds from taking to the arts or at best, permits them to consider the arts to be 'useful hobbies' and 'leisure activities'. Arts are therefore, tools for enhancing the prestige of the school on occasions like Independence Day, Founder's Day, Annual Day or during an inspection of the school's progress and working etc. Before or after that, the arts are abandoned for the better part of a child's school life and the student is herded towards subjects that are perceived as being more worthy of attention.

General awareness of the arts is also ebbing steadily among not just students, but their guardians, teachers and even among policy makers and educationalists. During a child's school life each student is given information about different subjects such as history, literature, sciences etc. and they are then able to make a choice of whether they would like to specialize in different streams of learning such as humanities, science or commerce. If the child is not given any exposure to the arts we are not giving the child the option to study arts at higher secondary stage.

Furthermore, we now live in times where our perception of arts stems from what we see and hear around us in the name of arts. Our young people are constantly bombarded with visuals from the worst of Bollywood, songs and accompanying music videos that titillate, and even exonerate violence and hatred. Art in schools is often equated, with sketches of Disney cartoon characters such as Mickey Mouse or Donald Duck, and theatre becomes a re-enactment of television soaps. Even schools and school authorities encourage arts of this nature and take pride in putting up events that showcase songs and dances and plays that border or vulgarity. In this climate of ignorance and lack of awareness regarding the ridhness and diversity,of the arts in India, we can no longer afford to ignore the importance of the arts and must concentrate all possible energies and resources towards creating cultural and f.artistic awarenes amongst the students of the country before we come to the sorry realization that we are a culturally illiterate society.

Arts in India are also living examples of its secular fabric and cultural diversity. An understanding of the arts of the country will give our youth the ability to appreciate the richness and variety of artistic traditions as well as make them liberal, creative thinkers and good citizens of the nation. Arts will enrich the lives of our young citizens through their lifetime, not merely during their school years.

During the discussions of this Focus Group over the past several weeks we have observed the following broad responses to our determined recommendation to make art education an integral and compulsory component of the school curriculum at par with any other subject:

- There seems to be virtually no opposition to the idea of making arts an important component of learning more as an extra curricular .activity, but there is considerable suspicion and opposition to the idea of making it a subject that every student must study much in the manner that a child is studies math, geography, history or other subjects.
- Many have said that the "fun" of learning will be lost if music, dance, arts and theatre to be a part of the school curriculum.
- Others are of the opinion that arts are important for the personality development of a child, but must not be pursued in school. Those who have an aptitude for the arts must pursue them outside the school system and of their own free will.

Repeated recommendations for integrating arts education in the school curriculum have not been implemented so far, and if we continue to relegate the arts as a mere extra curricular activity, or as a tool to teach other subjects, we may face the prospect of further artistic and cultural ruin. If, arts education is not introduced as a subject in school curriculum, it will continue to be an amusing, entertaining fringe activity alone, to be indulged in if and when there is time to spare from other more 'useful' activities. Students will not be aware of the rich and varied artistic traditions in the country, of the vibrant and ever evolving nature of creative arts, and wi,ll continue to learn only the occasional song or dance of dubious worth.

This group realizes the challenges facing the introduction of arts education as a subject in mainstream curriculum, and submits the following recommendations with the knowledge that these are but the first steps towards ensuring that India can and will be a country that respect, protects and propagates its artistic traditions. We have started an ongoing process, which we hope will be enriched and taken further by the inputs from different sources.

Broadly speaking, this Focus Group strongly recommends the following steps:

- Arts education must become a subject taught in every school as a compulsory subject (up to class X) and .facilities for the same may be provided in every school. The four main streams covered by the term arts education are music, dance, visual arts and theatre. Special emphasis may be given to Indian traditional arts, which currently face the threat of being drowned out by so called mainstream and popular arts.
- Teacher education and orientation must include a significant component that will enable teachers to efficiently and creatively include arts education.
- School authorities must acknowledge in practice that arts are to be given significance in the curriculum and not just restricted to being so-called entertaining or prestige-earning activities. They must permit and actively encourage students to study the arts.
- Public campaign and advocacy to promote arts education as a relevant subject must be undertaken. The mind set of guardians, school authorities and even policy makers needs to be jolted to accept that the arts will enrich the -ri development of our young minds.
- Emphasis should be given on learning than teaching in arts education and teachers should have participatory and interactive approach rather them instructive.
- Resources for research development and trainting must be allocated. More material on arts education should be made available for arts education teachers including electronic media aids.
- The group also recommended that there should be a unit of arts education having faculty in different areas of arts to empower the teachers, states-and develop materiais.

1. ART EDUCATION IN SCHOOLS: AN OVERVIEW

There is a lack of mediation and creativity everywhere, especially in schools. The arts are missing from our lives and we are giving way to violence. - Yehudi Menuhin

Since independence, various policy documents of the government have mentioned art education as an area of immense importance for the overall development of students. As early as 1952-53, the report of the then Education Commission emphasised the "release of creative energy among the students so that they may be able to appreciate cultural heritage and cultivate rich interests, which they can pursue in their leisure and, later in life". This has been described as one of the main functions of secondary education, which recommends that subjects such as art, craft, music, dance, etc. should be provided a place of honour in the curriculum.

It was further recommended that every high school student should take one craft, which is considered to be necessary at this stage; every student should devote some time to work with the hands and attain a reasonably high standard of proficiency in one particular craft, so that, if necessary, they may support themselves by pursuing it. But it is not on economic grounds only that this recommendation was made. By working with the hands, the adolescent learns the dignity of labour and experiences the joy of doing constructive work. There is no greater educative medium than making, with efficiency and integrity, things of utility and beauty. It develops practical aptitudes, facilitates clarity of thinking, provides an opportunity for cooperative work and thus enriches the personality of the student.

The Kothari Commission Report of 1964-66 emphasised that in an age which values discovery and invention education for creative expression acquires added significance. "Adequate facilities for the training of teachers in music and the visual arts do not exist. The neglect of the arts in education impoverishes the educational process and leads to a decline of aesthetic tastes and values." It recommended the Government of India to appoint a committee of experts to survey the present situation of art education and explore all possibilities of its extension and systematic development. It also recommended the establishment of Bal Bhavans in all parts of the country with substantial support from the local community. Another recommendation was Arts departments at the university level should be strengthened and research in these fields should be encouraged.

As a result, in 1966 the Governing Body of the NCERT appointed a committee under the Chairmanship of Shri K.G. Saiyidain to examine the whole question of improvement of art education in schools. The Committee submitted its report in 1967 with a set of recommendations emphasizing the aims and objectives of teaching art in schools, the critical role of art education in achieving the main educational goal, and the necessity of art education at all stages of education starting from the pre-primary stage. Its recommendations include planning of art education on a much broader basis and training of art teachers by teacher training institutes of the universities, so that after completion of courses at the art schools the students can be admitted to professional training in art education at these institutes for becoming trained art teachers for upper primary and secondary stages. The Committee recommended to introduce art education departments in teacher training institutes of the universities. It also recommended that NCERT too should have an art education department at the earliest.

The National Policy of Education 1986 emphasized fostering among students an understanding of the diverse cultural and social systems of the people living in different parts of the country as an important objective of school education. As a follow up of the 1986 Policy, the Program of Action, 1992, gives "an illustrated view on the cultural perspective interlinking education and culture in order to promote the process of child personality development particularly in terms of discovering the inherent potentialities of the child". Right from the pre-primary stage to the highest level of formal education, a programme of action was formulated. Mutual participation, use of inexpensive and relevant material for cultural exposure, promotion of the concept of cultural neighbourhood involving active participation of the community, reform of the curriculum, motivation of teachers, and efforts to encourage the young generation to participate in cultural and allied activities were some of the important features of this document.

All the three previous National Curriculum Frameworks (NCFs) of 1975, 1988, and 2000 emphasized art education by defining its aims and objectives in the school curriculum. The teaching of the different arts—dance, music, painting, etc.—should be based on the same fundamental principle of providing students opportunities for perfecting their own capacities and helping and encouraging them in the process. There was a paradigm shift in the objective of art education from dignity of labour by working on crafts to developing aesthetic sensibility and free expression.

These NCFs recommended that "Art education programme should concentrate on exposing the learner to folk arts, local specific art and other cultural components, leading to an awareness and appreciation of our national heritage. Activities and programmes and themes should also be chosen and designed so as to promote values related to other core components like India's common cultural heritage, history of freedom movement and protection of environment." Learning by doing and a wide exposure to art forms is a must for self-expression and widening of the learner's own experience. Art education should not be fragmented. It should adopt an integrative approach at all stages up to Class X.

In 1992, a committee was set up under the Chairmanship of Prof. Yash Pal to "look into the ways and means to reduce the load of curriculum on students and at the same time improve the quality of learning including capability for life-long self-learning and skill formulation". This committee brought out a set of recommendations in the form of a report, the crux of which was "learning without burden". However, practically the burden increased, leaving little scope for self-expression and creativity.

India is not the only country where this problem of art education exists. This is a worldwide phenomenon, which was taken up by UNESCO in the year 2000 with an appeal by the Director-General for promotion of art education and creativity at school level as part of development of a culture of peace. In his address he said: "A more balanced kind of education is now needed, with scientific, technical and sports disciplines, the human sciences and art education placed on an equal footing at the different stages of schooling, during which children and adolescents must be able to accede to a learning process that is beneficial, more broadly, to their intellectual and emotional balance. In that respect play activities, as a vital form of creativity, are one of the factors that deserve to be encouraged in the teaching of the arts. Arts teaching should stimulate the body as well as the mind. By setting the senses in motion, it creates a memory, which sharpens the sensitivity of the child and makes him or her more receptive to other forms of knowledge, notably scientific knowledge. Furthermore, it develops individuals' creative faculty and directs their aggressiveness towards the symbolic object of their choice."

2. STATUS OF TEACHING-LEARNING AND EVALUATION OF ART EDUCATION

In the previous pages we have seen that almost all the documents on school education laid an emphasis on the importance of teaching of art education. At the same time it had been given a secondary treatment by the schools, teachers, parents, school management and finally by the students who otherwise enjoy art related activities. The present status of art education has become worst from bad in the last few decades.

There are several reasons for the present status of art education. An ongoing study of NCERT, An In-depth Study of Teaching–Learning Practices and Evaluation Procedure in Art education, observes that all children enjoy creativity in their earlier stage of education but by the time they reach class VI, they start losing interest in art education.

One of the major reasons why art education has been a neglected area in the majority of schools is placing too much emphasis on the core subjects, which have a formalised procedure for assessment throughout the year including tests and exams. Since the assessment of art education is not reflected in the marks secured by students, neither teachers nor students, not even schools, take it seriously.

Another major problem is the lack of trained teachers for teaching art education subjects. Art education teachers who have undergone training in various visual and performing arts in art colleges for four or six years have very little to do with art education in school, let alone methods of teaching art in schools. They are trained in their own disciplines but not as educators; they lack training in methods of teaching art to children in the age group of 10 to 15 years. The teacher being the vehicle of children's education, there is a need for the teacher to understand children's psychology and to be aware of the pedagogy and teaching methodology for art education. Art education is an activity-based subject, which does not require a textbook, and this makes the role of teacher all the more important. They have to be more alert, innovative, and creative than any other teacher.

Another reason why art education is languishing is lack of awareness about career options in art among students as well as teachers. Teachers should be able to link art education with professional training and apprise the students of avenues of developing these as a career for their livelihood in future. The art teacher should be able to convince the school administration, parents, and students of the various aspects of art education which students can apply in their day-to-day life either as artists or as connoisseurs.

Suggestions for improvement in the status of arts education in schools:

- Arts education should be made compulsory up to class X.
- Non-examination based process oriented evaluation should be done
- Arts education should be an enjoyable, experiential learning process for free expression of children.
- Schools should provide time, space and resources for arts education activitives within and outside the school.
- More awareness needs to be created regarding arts education among different beneficiaries.
- Clear guidelines should be provided to schools and teachers for effective implementation of various dimensions of arts education curriculum.
- Teacher education and orientation at different levels needs a drastic change.
- Trained and specialized teachers should take arts education classes from upper primary stage onwards.

3. AIMS OF ART EDUCATION: A VISION FOR THE FUTURE

Literature, music, and the arts, all are necessary for the development and flowering of a student to form an integrated total personality.' -Rabindranath Tagore

Art education may be perceived as a tool for development of aesthetic sensibility among learners to enable them to respond to the beauty in colour, shape, form, movement, and sound. Art education and appreciation of one's cultural heritage may go side by side and reinforce the understanding of each other.

The inclusion of art education in the curriculum of school education as a compulsory subject up to class X has certain important objectives apart from contributing significantly to the overall development of the child's personality. Art education enables students to fully experience the joy of teaching–learning. It enables them to fully appreciate and experience the beauty of the universe and helps in their healthy mental development. Other objective of art education are to bring children closer to their environment, to teach them about their cultural heritage, and to inculcate in them respect for each other's work.

The experience gained earlier could be further strengthened at the secondary stage by enduring participation of all children in activities related to music, dance, drama, drawing and painting, puppetry, traditional arts and crafts, health and physical fitness, etc. The National Curriculum Framework for School Education, 2005, hopes that experiences gained by learners at primary stage in the area of fine arts will not only develop enough motivation and interest among them to pursue the various forms of art in the next stage of school education, but also develop aesthetic sensibility and respect for tradition and heritage in them.

Unfortunately, our education system has not duly recognized what great educationists and philosophers of India like Sri Aurobindo have said:

> "Plato in his *Republic* has dwelt with extraordinary emphasis on the importance of music in education; as is the music to which a people is accustomed, so, he says in effect, is the character of that people. The importance of painting and sculpture is hardly less. The mind is profoundly influenced by what it sees and, if the eye is trained from the days of childhood to the contemplation and understanding of beauty, harmony and just arrangement in line and colour, the tastes, habits and character will be insensibly trained to follow a similar law of beauty, harmony and just arrangement in the life of the adult man...."

3.1 PRE-PRIMARY STAGE

The visual and performing art forms should be taught in a fully integrated manner at the pre-primary stage. All subjects should be taught through drawing, painting, clay modelling, role-play, dance, story telling, singing, etc. The main objectives of teaching through art education should be the same as those of general education.

Objectives at the Pre-primary Stage

- Experience joy/enjoyment
- Arouse in the child certain elementary sensitivities towards its environment;
- Help children learn through playing freely with natural materials such as clay, sand, flower, leaves, etc.
- Help children learn through movement and sound by singing and dancing together and by exposure to natural environment to participate in the joy of sensing colours, forms, and rhythms

The learning experience for the children at this stage should be joyful and should not burden them with a heavy curriculum. They should be taught about their environment, the basic values applicable in day-to-day life, etc. The emphasis at this stage should be on free expression by the child.

At the pre-primary stage, the major objective of teaching through art forms is also to develop all the five senses of the child. This area of the curriculum should provide for experiences and activities that will contribute to all-round development of children's personality and should be commensurate with their level of development. Specifically, the experience of learning through music, drama, drawing, painting, and clay modelling should be soothing to the child. The selection of stories and anecdotes should be such that they play an effective role in strengthening the child's curiosity, imagination, and sense of wonder.

3.2 PRIMARY STAGE

At the primary stage, the orientation should be towards art as a medium of self-expression. Art education should be aimed at promoting self-expression, creativity, sense of freedom, and, thus, psychological health.

Objectives at the Primary Stage

- Experience joy/enjoyment
- Make children conscious of the good and the beautiful in their environment, including their classroom, school, home, and community, through an integrated learning approach that they enjoy
- Make children express freely their ideas and emotions about different aspects of life
- Develop all the senses of the child through observation, exploration, and expression

3.3 UPPER PRIMARY STAGE

The experiences gained by learners at the primary stage in the area of fine arts would have developed enough motivation and interest among them in the subject. The curriculum at upper primary and secondary stages needs to aim at developing learner's awareness and interest in a wide variety of arts both at the classical and folk level so that the learner is both the performer and the recipient of the performance. Art education can provide the most satisfying medium of creative expression which has to be given due importance in the best interest of the society.

Objectives at the Upper Primary Stage

- Experience joy/enjoyment
- Enable learners to appreciate different art forms and distinguish them
- Develop an insight towards sensibility and aesthetic appreciation
- Integrate the knowledge of art with daily life and also with other subjects
- Make learners more creative
- Make learners conscious of the rich cultural heritage of the nation

At the upper primary stage, art education should emphasise enlarged cultural activities, mainly through students' own participation, community help, and building up of certain core facilities.

3.4 SECONDARY STAGE

The secondary stage is apt for refining aesthetic sensibilities and promoting social values through projects on conservation of the natural and cultural heritage and through opportunities for studying Indian culture, working with artists/artistes of the community, organizing festivals and celebrations of the community at large, display of physical environment and surrounding landscape. Art education at this stage should comprise study of visual and aural resources and their exploration; projects to promote creative expression and exhibition of works in visual and aural forms; inter-group inter-school art activities; study trips and interaction with artists in the community; and exploration of traditional art forms including theatrical arts of the community and neighbourhood.

Objectives at the Secondary Stage

- Experience joy/enjoyment
- Introduce the student to new media and techniques and their use for creative expression and for making objects of common use
- Provide opportunities for developing awareness about folk arts, local specific arts, and other cultural components leading to an appreciation of national heritage and cultural diversity
- Enable students to use their artistic and aesthetic sensibilities in day-to-day life
- Get acquainted with the life and work of the local artists
- Develop creative expression through locally available material with the help of community
- Refine the sense of appreciation of the beauty of nature and the basic elements of art forms

Activities, programmes, and themes should also be chosen and designed to promote values related to India's common cultural heritage, history of freedom movement, and protection of environment. Learning by doing and a wide exposure to art forms is a must for self-expression and broadening of the learner's own experience.

Curriculum at this level is differentiated and specialized and art education too should be treated as a specialized subject. At the secondary stage, the orientation of art education should be *art as a way of knowing*.

Art education provides students non-verbal ways of learning about and interacting with the world. Art becomes a means of creating meaning and knowledge construction. Artistic expression is used as a process of inquiry and exploration of the social realities, world of things, world of ideas, world of emotions, and world of imagination. Art education at this stage would involve use of media and materials of the artists.

3.5 HIGHER SECONDARY STAGE

This stage has the maximum challenges. Only a small percentage of school-going student population reaches this tertiary level. For classes XI–XII, the orientation of art education would be *arts as a discipline*.

Objectives at the Higher Secondary Stage

- Attain proficiency in the art form
- Prepare for pursuing professional art courses
- Identify works of different artists and performers from their own region, country, and the world through art history
- Develop their own modes of expression after experimenting with different media
- Retain enjoyment in the arts

Art education for pursuing art as a discipline means using it as a vehicle for exploring the community's cultural heritage, learning the language of aesthetics, criticism, and art history, exploring possibilities of a professional career in the arts, and preparing to enter the world of arts as a performer, creator, critic, or connoisseur.

4. ART EDUCATION AND ITS INTEGRATION IN SCHOOL CURRICULUM

Science is the most creative form of Art.

-Sir C.V. Raman

In due course of time, the various education commission reports and the National Curriculum Frameworks for school education used different names and terminologies for art education and merged them with various other areas. In the report of the Education Commission of 1952-53, art education was referred to as Fine Arts, Crafts and Music for primary and SUPW (Socially Useful and Productive Work) for upper primary stages. It has also been variously termed as Work Experience and the Arts (Curriculum for Ten year School, 1975) and Arts of Healthy and Productive Living (NCFSE, 2000) and so on. *Now, there is a need to emphasise the fact that art education in the school curriculum should have its own identity and it should be addressed only as art education, comprising of the various visual and performing arts.* With this unified approach, there will be a paradigm shift in teaching objectives, content, methodology, approach of learning, evaluation, etc.

Art education should be one of the compulsory subjects from the pre-primary to secondary stages of school education. In the formal school system, art education has two approaches. The first approach is education through the arts, where learning takes place using different arts forms (visual as well as performing) tools in the teaching–learning process. This approach integrates art education with other subjects as a two-way process. It integrates art education with social sciences, languages, science, and mathematics in the form of content, where information on the art forms are provided, and also in the form of activities/ projects/ exercises, etc. The second approach is art education as a subject.

Learning through the arts should take place throughout school education (2+10+2) stage-wise. We visualize a vertical progress of child's learning. In the pre-primary stage or early childhood, learning should take place only through drawing, painting, role-play, mime, dance, movement, gestures, story telling, singing, etc., where both the teacher and the taught take part in the activities. This should continue to the next stage up to class III, where the child enters formal school system. At this stage, the child should be given sufficient space and scope for free expression through all the art forms, including the crafts. In the late primary stage (classes IV–V), schools may have separate classes for arts and crafts, music, dance, and drama. At the upper primary or the middle school stage, art education should be a separate subject and this should continue up to the secondary stage or class X.

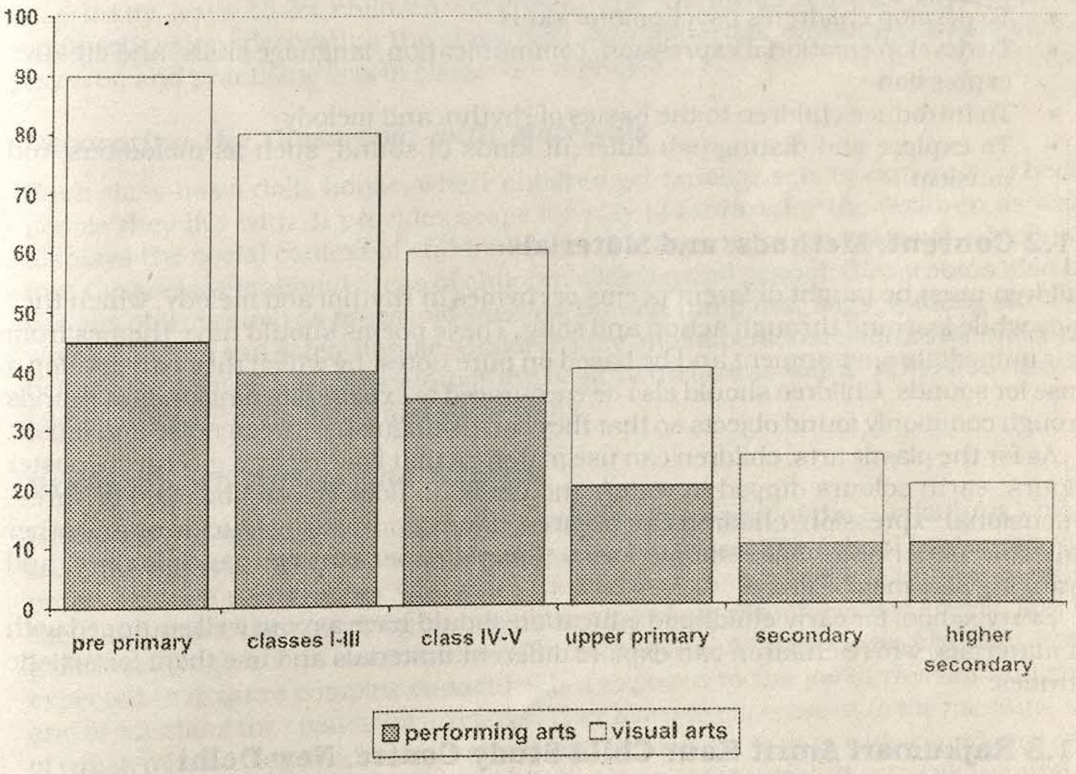
Art education should not be used by the schools merely as a showcase activity on different occasions such as annual function, inspection day, etc. Art education should should be applied in activities such as arrangement of

Bal Sabha or the Children's Forum

In an ideal situation, all the schools should have a forum for children where their creativity and artistic talent can attain full expression. This should be a weekly or fortnightly event for half a day (probably on Saturdays) and children should be allowed to visualize the theme, select the programmes, and organize the events, which teachers would be invited to attend. It should be a children's programme, where they can exhibit their weekly art and craft works, recite poetry composed by them, sing, dance, perform dramas selected (or written) and practised by themselves. These may not be events with a lot of paraphernalia, but simply organized, where the school provides space and time to children for self-guided creative expression in various art forms. Such practices are prevalent in many schools and may be adapted by other schools also.

classrooms, galleries, halls, corridors, etc. and designing of school diaries, cards, school bags, etc.

Learning through the Arts: Integration of Arts in Education (Stage-wise)



Since this is an activity-based, experiential subject, it gives scope for observation, imagination, and visualization in the process of creativity. Every individual child has all types of emotions, which need to come out of the child's inner self: art education helps them in this process.

5. CURRICULUM OF ART EDUCATION

5.1 PRE-PRIMARY STAGE

Children at this stage are in the age group of 3-5 years, who have a lot of inquisitiveness and a very high level of energy. They need avenues to release this energy and it can be best utilized by involving them in creative activities. At this stage, all the education should be through arts, be it drawing, painting, clay modelling, singing, actions, or movements.

There is another National Focus Group, working on Early Childhood Education and the curriculum for this stage will be prepared after consultation with the Group.

5.1.1 Objectives

Major teaching objectives at this stage of education are:

- To engage children in joyful activities
- To help children to observe their environment and immediate surroundings, be curious, and develop imagination leading to visualization
- To encourage the child to express freely and spontaneously
- To develop children's psychomotor skills
- To develop emotional expression, communication, language skills, and creative expression
- To introduce children to the basics of rhythm and melody
- To explore and distinguish different kinds of sound, such as melodious and musical

5.1.2 Content, Methods, and Materials

Children must be taught different poems or rhymes in rhythm and melody, which they enjoy while learning through action and song. These poems should have themes from their immediate environment and be based on pure notes, by which they can develop a sense for sounds. Children should also be encouraged to explore different kinds of sounds through commonly found objects so that they can distinguish between noise and music.

As for the plastic arts, children can use materials that flow freely, e.g., crayon, poster colours, earth colours dipped in water, and chalk on floor or blackboard. For three-dimensional expression, children can be given clay or non-toxic plasticine or any other malleable material to make simple forms. Simple paper cutting, paper folding, and arranging also may be given.

Every school for early childhood education should have a room well equipped with art materials, where children can explore different materials and use them for artistic activities.

5.1.3 Rajkumari Amrit Kaur Child Study Centre, New Delhi

Rajkumari Amrit Kaur Child Study Centre (RAKCSC), established as the Lady Irwin College Nursery School in 1955, functions as a laboratory to the Department of Child Development, Lady Irwin College. Ever since then, the Centre has been evolving and adapting to the changing needs of society, offering a wide spectrum of services for the optimal care of young children. The centre offers pre-school education, day care and after-school facilities for children of working parents, early intervention through home-based training programmes for children with disabilities, and family support and counselling. Beginning 50 years ago with only nine children, the Centre now has 250 children including approximately 40 children with special needs in the age range of 3–6 years.

Children in the school are given exposure to diverse experiences through the medium of arts, which have the propensity of invoking spontaneous responses in children. Curriculum is translated into methods and time divisions that permit affordable freedom for children to explore their desire for movement, be aware of the rich linguistic environment, and be able to express in a warm and responsive atmosphere. The emphasis in the Centre is on using a mix of multiple strategies and methods to engage children actively in the process of teaching–learning. With ECCE being the foundation for initiating interest and forming attitudes towards settings of learning it's significance to provide joyful contexts of expression and comprehension. The arts are used in many forms and ways in the school.

Arts in the ECCE Settings, Especially Theatre

It is well understood that the arts are integral to children's interests and activities. Schools use many ways to let children experience the art forms both for expression and comprehension: decorating the classroom with materials, working with artistes and experts, and practising arts in classroom everyday.

Decorating the Classroom with Materials

Each class has a dolls house, where children get familiar sets to explore and become people they live with. It provides scope for play of fantasy for the children as well as displays the social context of children's life. The experience provides valuable insight into the social-emotional areas of children's life beyond school. Classrooms also have various objects such as props, old sandals, purses, duppatta, bags, walking stick, etc., which children can safely handle. Children play and impersonate adults for sheer joy of being 'the other'. Such opportunities are basic to theatre as well as other activities that foster curiosity, confidence, and conviviality.

Working with Artists and Experts

Besides learning the arts from teachers organically as part of the curriculum, children have the opportunity to work with professional artistes. The school has on its rolls a potter and a music teacher who meet the children once a week. Children work with them and watch them working on the kiln or sing along with the music expert, and thus gain knowledge about instruments and techniques. At this stage, children are not expected to acquire complex capacities but exposed to the joy of rhythm and rhyme and of watching the creation of artefacts. They learn to experiment in the medium, some of which may be displayed at annual events. The attempt is to provide experience of arts using materials and techniques and open avenues of interest. It is borne in mind that the ECCE curriculum impacts children's relationship with the environment of learning in the later years of schooling.

Arts as an Everyday Classroom Practice

Teachers of young children are adept at using arts in everyday transactions with children. Learning numbers or languages is facilitated with the use of colourful worksheets.

Moreover, each day begins with 'song time', when children choose or recite rhymes and songs of their interest. Children also supplement the musical experience with simple instruments such as *dhapli*, pea pods, or a box with pebbles. Similarly, the basket of props or the dolls corner is a busy area of playing *house-house*. Such areas serve to create interest in the arts in a very natural and organic manner.

The After School Group of Children

There are children who come to the Centre after their regular school, as their parents are not free till they return from office. This group is in the age range of 5–12 years. Crafts, painting, and dance are some of the main afternoon activities. Children are taken for art lessons to the nearby art school. They participate in the annual events and other festivities. The caregiver assists them in making cards and participating in other related festivities on various festive occasions.

5.2 PRIMARY STAGE

Even at the primary stage, art education should be integrated with all the subjects and used as a tool of teaching different concepts, especially in classes I, II, and III. At the same time, from class I onwards, children should be involved in creative activities through various art forms and there should be a provision of separate periods for visual and performing arts.

5.2.1 Objectives

- To experience joy or enjoyment
- To make children conscious of the good and the beautiful in their environment, including their classroom, school, home, and community through an integrated learning approach which a child enjoys
- To help the child freely express his/her ideas and emotions about different aspects of life through different art forms
- To develop all the senses of the child through keen observation, curious exploration, and spontaneous expression
- To enable children to understand the body, its movements, and its co-ordination
- To make children familiar with their immediately local or regional art forms
- To develop a sense of rhythm through breath as well as external expression
- To enable children to identify different forms of classical music and dance

5.2.2 Content, Methods, and Materials

At this stage children should be encouraged to explore and develop their ideas by recording what they see around them, trying out different materials, tools and techniques, and engaging in activities such as drawing, painting, printmaking, collage, clay modelling, etc. They should be encouraged to work with colours, patterns and textures, lines and tones, shapes, forms, and space by using pencil, pastel, poster colour, watercolour, paper, etc. Children should be made to work in small groups and share the resources. This will bring the feeling of co-operation while working together.

In classes I and II, children may be gently guided to see forms and colours and most of the time they should be left with the material to experiment and express whatever they observe around them. At this stage, formal training is not required and too much of instructions/guidance will hinder their expression. The teacher should tell them more about events of life, nature and environment, and what they see and observe around them. After that, they may be encouraged to explore and express their ideas in colour, shape, form, and space. From class III onwards, they may be given simple topics related to their day-to-day life or immediate environment, taken to workshops of local artists or craftspersons, exhibitions, local monuments, fairs or *melas*, etc., where they can be exposed to the social life and their socio-cultural heritage. Also, these visits should be an illustrated extension of whatever they learn in their curriculum. Teachers along with students can take part in various such school activities throughout the year.

The national anthem, national song, and simple compositions from the textbook (in their mother tongue or Hindi) may be taught with action and in chorus. Patriotic songs, community songs, festival songs, and traditional regional songs may also be taught. Students should know to mark the basic beats. Preliminary knowledge of rhythm and melody may be imparted. Experimenting with different types of sounds coming out from the self (body) and the objects found around (utensils, thread, leaves, drums etc.) may be encouraged.

In classes IV–V, children may be taught to distinguish between pitch, volume, timbre, and duration. Games of music and drama can also be played. Use of regional language, proverbs, lullabies, etc. may be included in the curriculum. At this stage, students may be made aware of *shuddha* or pure notes and *vikrit swaras*. Basic *alankars* can be taught along with the *sargam* practices. Simple compositions from the textbook, patriotic songs, community songs, and festival songs in the regional language may be taught. Teachers may develop simple compositions based on themes/concepts taught in the language or the environment to create awareness among children about their social context and immediate environment.

Some Guidelines for Art Education at the Upper Primary Stage

Proportion in the context of relationships of objects:

- What is important or close to the experience of the child becomes large in size. For example, eyes (seeing: visual), hands (feeling: tactile), feet (exploring: sensory-motor) become larger or smaller according to their importance in relation to the other objects. A flower becomes larger than the house because it is an object that can actually be grasped and is not overpowering for the child. The ears, hair, and mouth are not immediately important and so are often omitted.
- Known reality can become more important than seen reality. Four wheels of a cart/car may be drawn though only two are seen in actuality. Both viewpoints are equally valid.

Methods used:

- Change of size and shape of paper changes the whole way of seeing things.
- Use of ruler is discouraged. The aim is not precise architectural drawing but an expression of the impression or gist of the object drawn. Steadiness of hand, sharp observation, and non-reliance on mechanical instruments are encouraged.
- Fill-in line drawings should be discouraged. Lines drawn should be different, e.g., one thin and precise and the other thick, fluid, and flowing, expressing mass form rather than an outline. Line is used as a language, a specific element of picture making.
- Working together is a very important part of class work. Sharing of ideas,

arriving at mutual agreement or disagreement, planning together should be encouraged. Groups may be formed with collective responsibility. These groups may be horizontal or vertical. Such activities are very useful for confidence building, learning to share, and respecting others' viewpoints.

Materials and mediums:

- Students themselves should be involved in selecting the medium. This requires active participation and choice.
- When they have a choice in selecting the medium, they choose modes they are good at and thus they are happy about the outcome.
- Mixing of mediums can make their work more attractive. It helps them have an understanding of each medium, figure out similarities and differences between mediums, and discover new ways of expression.
- Collage using old colour magazines, newspapers, old calendars, etc. gives children a choice of unlimited colours and shades. Also it does not involve much expense. It inculcates a deeper sense of form in children.

6. CURRICULUM OF VISUAL ARTS

6.1 UPPER PRIMARY STAGE

6.1.1 Objectives

At this stage of school education, children can handle more complex materials and themes. So far, whatever they have developed and experienced can take form. Thus, apart from free expression, the objectives will shift to the following:

- To work together on small and large projects
- To encourage students for free expression and creativity
- To acquaint students with basic elements/principles of design
- To teach the basic characteristics of different techniques and mediums and their practical applications
- To develop orientation towards sensibility and aesthetic appreciation
- To make children understand the cultural diversity by recognizing different traditional art forms prevalent in the country

6.1.2 Content, Methods, and Materials

At the upper primary stage, the art education programme should comprise drawing, painting, collage, clay modelling, making of puppets; creating artistic objects by free expression, simple concepts of visual arts, knowledge of works of well-known artists, both contemporary and historical, etc. Emphasis should be laid on the use of learners' own imagination, development of their own concepts, and expression through observation and exploration. They should be enabled to develop a sense of organization and design and to experience the joy and satisfaction in aesthetic pattern that permeates all life.

Activities related to day-to-day events of life, nature, and environment may be learnt through drawing human and animal figures, free hand sketching, designing book covers, cards, folders, ties, etc., and dyeing, printing and embroidery to design textile, etc. At this stage, children should develop senses of perspective, proportion, depth, light and shade, texture, etc. by using pencil, pastel, poster colour, watercolour, collage, pen.

brush, ink, linocut, computer, etc. as tools of expression. They can also use different sizes and types of paper. They should be encouraged to work together in small and large groups. They should be given opportunities to maintain the resources of the art room and visit workshops, museums, and exhibitions.

6.1.3 A Case Study of Carmel Convent Sr. Sec. School, BHEL, Bhopal

Carmel Convent School not only encourages its students to study the usual subjects but also emphasises extracurricular activities to develop their creative and imaginative faculties. The extra-curricular session starts in April. This is the time when children are free from their exams and are excited begin their new classes. This is the month when drawing and painting competitions start. Students are provided with some current topic. There is no restriction regarding the medium; they are encouraged to use whichever medium they want for their expression of thought. After the summer vacations, July is an important month for Carmel Convent School as the Carmel Day is celebrated in July. On this occasion, the whole school is decorated with paper items, flowers, and wall hangings.

August is called the sisters' month. With celebration of the festival of Rakhi, students are taught to make different kinds of Rakhis in their craft class. In September and October, the school conducts science and crafts exhibition. One can take a look at the immense creativity which the school students display. The items displayed at the crafts section are all made by students in their classroom, which include paintings, drawings, embroidery-work, wall hangings, soft toys, paper bags, ceramic works, etc. Various competitions, on the basis of classes or groups, are also held at this time, including pot-decoration, *rangoli, alpana, mehendi*, 'best out of waste', flower arrangement, photo framing, lantern making, vegetable carving, etc.

In December, students participate in either the sports day or the annual function, conducted alternately. Students prepare all the costumes, masks, stage sets, and dance programmes. The month ends with celebration of the Christmas Day. Students perform various cultural programmes and enjoy with Santa Claus.

Then comes the time to bid farewell to the students of class XII. The love of their juniors can be seen in the fact that even the invitation cards are made by class XI students, let alone the decoration. Similarly, students get an opportunity to display their love for the teachers on the occasion of the Teachers' Day.

In the prayer service, which has to be performed by each class, students choose a topic and convey their thoughts regarding that topic with the help of songs, skits, and charts. This is a good way to improve the imaginative ability of the students. Students are also encouraged to take part is interschool competitions and bring laurels to the school.

6.2 SECONDARY STAGE

At the secondary stage, students will have the choice of opting for one of the following art education subjects—visual arts, dance, drama, or music.

6.2.1 Objectives

- Joyful experience
- To refining aesthetic sensibilities based on earlier experiences.

- To expose the learner to the cultural diversity of the country through folk art forms, local specific arts and other cultural components leading to an awareness and appreciation of national heritage.
- To develop a perspective of artistic and creative expression through experimentation with different tools, techniques and medium in two and three dimensional visual art forms.

6.2.2 Content, Methods and Materials

Drawing and Painting

To express original experiences freely and spontaneously, learning to observe; development of sense of perspective, proportion, size, depth, light and shade, tactile feeling, season, time, mood etc. are some of the main objectives of art education at this stage. Basic knowledge of human body and its proportions, compositions based on various themes, knowledge of local/traditional art forms, sense of perspective, etc. may be included in the syllabus of class VIII. They may be given projects leading to creative expression and experience, participation in inter-group and inter-school art activities, study trips, interaction with artists in the community, and awareness of traditional art forms in the community and neighbourhood. Values related to other core components in education, such as India's common cultural heritage, history of freedom movement, national identity, constitutional obligations, current social issues and protection of environment, etc., may be given as topics for compositions. Students during the two years of secondary education must be allowed to work in at least three mediums using pencil, pastel, water or oil based colour, collage, linocut, pen and ink, and mixed mediums.

Sculpture

Plaster of Paris, different types of clay, papier mache, sketching practice, making of armature, pottery (hand made), and ceramic work may be included for three-dimensional expression. Students may be encouraged to make useful products like pottery items for the school or home.

Theory

At this stage, theory should be taught along with practical study. In theory, students can be made aware of contemporary artists, their style of working, paintings, sculptures, and relief works in architecture of various periods. Art history to should be taught along with various isms and styles, followed by more information on artists who specially interest the child, rather than imposing the study of certain artists, etc. It would be advisable to develop among them a sense of critical analysis of art works, how and why works of art, craft, and design differ over time and from one place to another. They can also review their own and others' works, observe and express their views on original works and reproductions, visit galleries and museums, and participate in Internet-community-based project works.

Art-related Practices at Patha Bhavan, Shantiniketan

Vrikharopan or the tree planting ceremony takes place on the 22nd of *Shravan* every year to mark the death anniversary of Rabindranath Tagore. A sapling is carried on a decorated palanquin in a procession of dancers, *chatri* bearers, and schoolgirls representing the five elements of nature. The area where the sapling is to be planted is decorated by *alpana* designs. Among Vedic chants, songs, and invocations of the five elements of nature, the sapling is planted. The decorations and jewellery worn by schoolgirls are made of leaves, flowers, pearls, and buds.

Halakarshan or the ploughing ceremony is performed on the morning of the 23rd of *Shravan* every year. The ceremony begins with ploughing the area, which is decorated with *alpana* designs. Two decorated bulls plough the field amid Vedic chants, recitations, and music. This occasion also marks the start of a week-long programme called Rabindra Saptaha. During this, every evening, talks, discussions and programmes related to arts, culture, literature, rural reconstruction, education, etc. based on Tagore's philosophy are conducted by eminent personalities.

Rakhipurnima is celebrated on the 26th of *Sharvan* every year, when students make *rakhis* using innovative materials and designs. The senior students ensure that no wrist is left empty.

Independence Day on 15 August is celebrated with songs and decorations with *alpana* designs—using leaves and flowers, or paints/powder or liquid. In the evening, the area is decorated with lamps and school and college students sing patriotic songs.

Teacher's Day on 5 September is celebrated by students by taking classes, arranging exhibitions, and decorating certain areas with *alpana* designs and seasonal flowers and leaves. Sports events with combined participation of teachers and students and a special programme by teachers for the students are organised in the evening.

Shilpotsav is celebrated on the 31st of *Bhadra* every year in Sriniketan. An exhibition of handicrafts is held. This *utsav* honours traditional crafts and craftspersons and is an alternate to *Viswakarma Puja*.

Anandamela and *Mahalaya* are held on the 8th of *Ahwin* in the school premises. For this, students from each class make small and large objects using a wide variety of materials. Student groups (of eight or more) decorate their stalls, design posters, and keep account of their sales. Students also bring out small magazines and publications of their creative writings and drawings, calendars and cards, objects made from commonly found things, etc.

Celebration of *Dekha Divas* of Maharishi Devendranath Tagore starts with *Paush Utsav* in the last week of December every year. On this morning, a programme of songs, recitations, and speeches is held at the Chatim Tala. The area around the *Chatim* tree is decorated with *alpana* designs made by college students of Kala Bhavana. The occasion celebrates the Brahmo Dharma. *Paush Utsav* is held for 3–4 days. In this, local artisans and artists participate in cultural programmes and exhibitions, and a fair is held.

Celebration of the Foundation Day of Visva Bharti and a convocation of the schools are held on the 8th day of the *Paush* month every year. The convocation area is decorated with a very large *alpana*, made by school students over a period of 3 to 4 days.

Christutsav or Christmas is celebrated on 24 December. In the evening, the Upasana Hall (or *Mandir*) is decorated with candles and *alpana* designs. Singing of devotional songs and carols and discourses on the festival are arranged on this occasion.

Maharishi Smaran is held on the 6th day of *Magh*, that is, the death anniversary of Maharishi Devendranath Tagore. On this day, there cultural programmes are held at the Upasana Hall in the morning and at the Chatim Tala in the afternoon or evening.

Sriniketan Varshic Utsav (Annual Festival) is held during the 23rd to 25th days of *Magh*. A programme is held on the 23rd to celebrate the foundation day of Sriniketan. Local artists and artisans hold exhibitions. The area is decorated with *alpana* designs.

Basant Utsav (*Dol* or *Holi*) is held on the 22nd day of *Phalgun*. On this day, students colour their traditional dress with yellow colour, make ornaments with *Palash* (flame of the forest) flowers and leaves, welcome *Basant* with song and dance, and throw dry colours on each other.

Gandhi Purnaho is celebrated on the 10th of March, when all school and college students and teachers participate in cleaning up of the whole *ashram* (school and college) area as well as their hostel areas.

On the last day of the Bengali year, the 30th of Chaitra, a programme is held in the evening at the Upasana Hall (*Mandir*). On the Bengali New Year's Day, which also celebrates the birthday of RabindraNath, the 1st of Baishakh, a programme of songs and recitations is held in the morning at the Upasana Hall. In the evening, a dance drama is staged by the students of class IX. Students are involved in the stage and dress designing. Rehearsals continue for a month before the programme. Every Wednesday morning, *upasana* is held at the Upasana Hall (*Mandir*). Articles from writings of Rabindranath Tagore are read. Songs and Vedic mantras are recited.

6.3 HIGHER SECONDARY STAGE

At the higher secondary stage (classes XI and XII), fine arts can be one of the optional subjects and all the schools should provide facilities for fine arts subjects, depending on the resources available. The curriculum of fine arts subjects, be it painting, sculpture, or graphics, should involve 30% of theory and 70% of practical work. The dimensions of history of arts and aesthetics should be included in the theory curriculum.

6.3.1 Objectives

At this stage of education, emphasis should be on a professional approach towards the subject rather than on creating awareness and knowledge, which was generic in nature up to class VIII. At this stage, it should be taught as a discipline. The teaching objectives here will be:

- To sharpen the skills attained earlier
- To develop professional skills in fine arts
- To develop a perspective of design
- To help students express themselves in their preferred style and medium
- To develop a historical perspective of art in the context of the world as well as India
- To retain the joy of the activity

6.3.2 Content, Methods, and Material

The emphasis should be on exploring and developing ideas drawn from their imagination and experience, from their own observations, and from their own collection in their sketchbook to suit different purposes and audiences. Now, they should be able to draw on an expanded range of materials, tools, techniques, and processes (for example, drawing, designing, and print making), mix and adapt them to achieve effects, review their own and others' work, use critical feedback to develop their work further, and identify art, craft, and design of different times in western Europe and the wider world.

7. CURRICULUM OF PERFORMING ARTS

7.1 DRAMA

By nature children are inventive and willing to suspend disbelief. In their own play, they dramatise without adult help and experiment with ideas. Through this play, children gradually come to grips with the adult world. They explore situations and discover how they feel.

Drama is a creative activity. It provides a medium through which the individual can express his/her ideas and reaction to the impressions he/she receives and, by expressing them, learn to evaluate and experience them. By this process, vague impressions are brought into sharp focus, puzzling ideas are demystified, and fragmentary ideas are put in perspective. Drama, like other creative arts, makes the individual examine what he is thinking and feeling. Imaginative observation is stimulated and our understanding of the world and ourselves is extended and deepened. From the earliest times, drama has fulfilled this basic need of human beings. Drama, in its true sense, is a self-evolving art form.

At the elementary level in schools (classes I–VIII), drama is perceived as a way of learning, a socializing activity, and an art form. As children grow and move to higher stages of school education, drama takes the shape of an organized form of performing art, with groups of children working together for common goals. Drama fulfils children's psychological need of free expression and imagination, builds their characters, and finally through stories leads them to play production for an invited audience.

Drama at Different Stages of School Education		
XI – XII	Formal and organized drama	**Drama as Performing Art**
IX – X	Drama	
VI – VIII	Improvisation	
I – V	Free play	**Elements of Creative Drama**

> Creative drama in its truest and deepest sense cannot be stereotyped. Its like a river—always on the move—making connections: connecting river banks, connecting starting points and destinations; connecting through improvisation, action and reaction, initiative and response, thinking and feeling; relations between people, ideas, and even centuries!
>
> *- Julie Thompson*

7.1.1 Upper Primary Stage

The objectives of teaching drama at both primary and upper primary stages are very close to the objectives of modern education (new education), e.g., development of creative, aesthetic and critical abilities, development of communication skills, social growth and cooperation, inculcation of socio-cultural values, and above all knowledge of the self. Children learn better in a state of relaxation, where they not only enjoy learning but also construct their 'own knowledge' through different experiences that are unimaginable in a traditional classroom situation.

Objectives

Main objectives of teaching drama at the upper primary stage are:

- To develop a sense of organization, the power of observation, and concentration in children

- To enhance imagination and support self-discovery
- To help children create and organize their own ideas and perceptions through body movements
- To impart understanding of human relations and their conflicts
- To use drama as a technique in establishing peace and harmony in the school

Content

- Breathing exercises and physical movement of body (with music and without music)
- Different kinds of theatre games and exercises based on observation, concentration, trust, responsibility, imagination, vocabulary, and language
- Loud reading of stories and poem recitation with expression
- Narration and story telling
- Basic understanding of different kinds of sounds, rhythms, clappers, and other local materials, creating human sounds with variations of pitch, note, etc.
- Mime and pantomime
- Simple performances of short plays and skits
- Visit to a local theatre show/performance; its appreciation and evaluation

Children should be encouraged to get information about their own traditional and folk forms of theatre. They should be asked to watch *Ramleela*, *Rasleela*, and other festival

What does a Child Gain from Participating in Creative Dramatics?

First and above all, the children gain enjoyment, for the very word play, understood in its widest sense, indicates enjoyment. Childhood is a time of playing, be it with peers, pets, adults, or with life itself: it is through such a process of play that the child discovers and experiences the world in a structured manner, step by step. There is a wide range of other benefits: drama provides an outlet for self-expression and helps the development of imagination, creativity, and artistic awareness: it increases social and mental awareness (particularly through role-play), enhances the child's fluency of speech and expression, leads to self-knowledge, self-respect, and self-confidence. It gives children an opportunity to learn how to co-operate with others and helps develop orderly thinking and the ability to organise. Drama creates and fosters a sense of discipline. Children quickly learn how to co-operate each other in a team to achieve collective goals in a limited period of time. This requires listening, problem solving, and time management skills, besides initiative and resourcefulness. Participation in drama improves physical co-ordination and physical fitness. It may also have a therapeutic effect, and help children to deal with their real-life problems (socio-drama), or a cathartic effect, enabling them to act out the violence and frustration in them (psychodrama). It provides social and moral training, helps young people to mature emotionally, and prepares them in a very real, though playful, way for the complex roles of adult life.

The key to this evolutionary process is respect for the child, his/her feelings, emotional states, beliefs, and also respect for the child's ability to perform tasks independently. Teachers should never demonstrate how a role is to be enacted. Telling children how to speak lines or make moves on stage limits their imagination and stunts their development. They must have the freedom to discover their own hidden impulses and potentials through play, thus motivating them for experiential learning. This enables them to seek their own highly individual ways of expression. Above all, this is how they will enjoy what they do.

performances in their own regions and initiate discussions in the class on different roles, characters, lifestyles, problems, attitudes, and interests, etc. that they have observed and understood while watching these performances.

Methodology

Since drama involves both individual and group work, the methodology should be mainly the workshop mode, where each child gets a chance to participate in all that goes in a drama class. The teacher's role is that of a facilitator and motivator. Children should be exposed to various independent tasks, which they take up individually as well as in groups.

7.1.2 Secondary Stage

Theatre is one of the most enriching experiences a person can have. Not only does it widen one's experience with life but its helps develop skills for coping more effectively with life's real problems. I am certain that human dignity has its roots in the quality of young people's experience.

- Dr Lee Salk

Objectives

Children at the secondary stage are in a period of transition; they are, in fact, adolescents and are in the process of preparing for adult life. Hence, the objectives of teaching drama should include catering to their changing psychological needs, particularly, their search for their own identity. The following objectives should be kept in mind while teaching drama to students at this stage:

- To foster self-awareness and -expression
- To create aesthetic awareness and develop imagination
- To enhance confidence in movement and speech
- To strengthen concentration and logical organization of ideas, thus developing the power of analytical thinking
- To develop tolerance and sensitivity towards oneself and others in the society; to develop appropriate attitudes towards oneself and others through creative expression
- To understand inner and outer conflicts of life and help find solutions
- To integrate learning experiences of other subjects into drama

Content

- Advanced Theatre Games: mirroring groups and leaders, enacting conflicting emotions (laugh and cry), responding to music, memory games like action/words, etc., story-telling, and role-play, improvisations of various kinds with development of theme and story, etc.
- Body Language: observation and understanding of different gestures and postures used at different stages of human life and related to different strata of society; using the body expressively and as a specific character
- Voice and Speech: exercises for voice articulation, projection, and expression; speech-related activities (loud reading with expressions) to be taken from language texts in English, Hindi, and mother tongue, etc.; interesting news items and stories from Indian classics/folklore, etc.; activities of narration and story-telling of the traditional kind
- Aesthetic Appreciation: exposure to various theatre performances by different groups; analysis and review of performances; evaluation of one's own growth

through daily reflections; keeping record of one's observations and experiences in a 'journal'

- Play Making: creating a short theatre piece from a text or through improvisation
- Stage Craft: awareness and use of different stage crafts, viz., costume and make up, sound and music, lighting and stage setting, etc.
- Theatre Etiquette: exposure to different stage productions and local performances; learning certain rules of self-discipline to be observed during the play, such as taking seats before the play starts and avoiding consumption of food items, use of pagers and mobile phones, etc.

Students should be encouraged to visit exhibitions, watch plays on stage, and appreciate Indian folk forms as the audience. Local theatre personalities may be invited to school for interactive sessions with students and lectures or demonstrations. Towards the end of the session, students should be able to evaluate their own growth through an objective self- appraisal procedure.

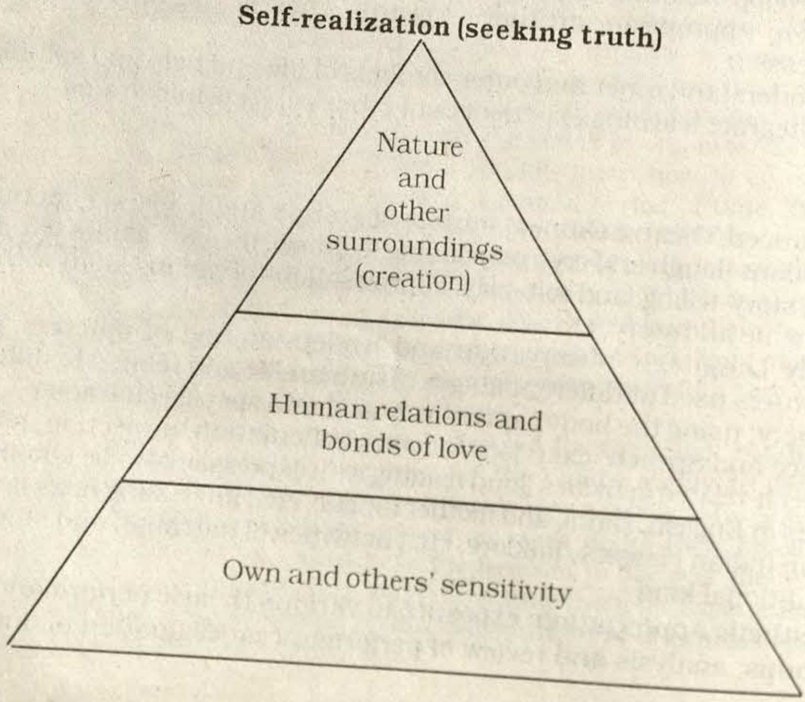
Methodology

- The workshop mode should be adopted, which is participatory in nature.
- Group work should be encouraged for peer learning and exploration.
- Group consensus must be strictly adhered to wherever required.
- Teachers should have the spontaneity to change their stances from a facilitator to a manipulator and enabler.

The teachers' role in a drama class of secondary education stage is very crucial. Teachers should be vigilant of their own variation of moods. They should also grow with the group by making self-observations and reflections. They should maintain a record of their own feelings and emotions in a diary to become better teachers every day.

The Sensitivity Pyramid through Drama

The highest goal of any art form is 'self-realization'—knowing, observing, awareness, and its growth—a living and growing conscious individual.


Self-realization (seeking truth)
Nature and other surroundings (creation)
Human relations and bonds of love
Own and others' sensitivity

Art forms

1. Aesthetic value (beauty and harmony)
2. Educative value (knowledge skills and method)
3. Spiritual experience (highest) (including fine and performing arts)

Refinement of human nature—evolving from lower to higher forms of energy.

7.1.3 Higher Secondary Stage

Objectives

- To develop sensitivity towards self, others, and also towards one's own environment
- To help learners understand their own personality through a deeper understanding of self
- To help learners strengthen their powers of observation, concentration, reasoning, imagination, and analysis
- To get an understanding of different dramatic modes
- To familiarize learners with drama as an art form, comprehend its aesthetic value, and develop a sense of appreciation for it
- To expose learners to Indian art and culture and develop respect for it
- To prepare and equip learners for future life for better adjustment and understanding of human nature

Content

(A) Acting

Theatre Games and Improvisation

- Advance physical and mental exercises selected for development of body, image, body balance, and the five senses; yogic discipline asanas and meditation
- Concept of *abhinaya*; understanding the concept of *bhava*, *rasa*, and a*bhinaya* through practice
- Exercises in facial expressions, variation of body movements and play-reading
- Exercises selected for practising postures and gestures

Voice and Speech (Theory and Practical)

- Understanding the mechanism of voice production and the respiratory system; development of breathing; learning the correct way of breathing and the mechanism of resonators
- Development of voice, volume, pitch, tone, projection, octaves, etc.
- Learning to identify and avoid the different errors in speech
- Practising good speech—prose, poetry, dialogue, dramatic text, etc.

(B) Dramatic Literature and Play Production

- Dramatic structure, development of characters, play process, analysis of play, review and critique
- Production process
- Short review of different kinds of theatre, particularly Indian theatre

(C) Stage Techniques

- Understanding the basics of stage design; the importance of costume designer and stage maker; research and actual design for a play
- Discovering music and sound effects for appropriate modes for a play
- Lighting as a part of production design and exposure to different lighting systems and equipment

(D) Theatre Management

Students should learn to design posters, tickets, brochures, handouts, etc. for a specific school event. Students at the higher secondary stage should be encouraged to watch local stage productions, public performances, cultural festivals, etc. and maintain a reflective journal. They should be able to evaluate a stage production and give their own opinion and feedback on such a production for better theatrical presentation. Students should be able to write their observations, experiences, and other details of their self-growth on a daily basis. They should also be able to reflect on social issues, human nature, and relations and keep a record of the same in a journal.

Methodology

1. Theoretical inputs are to be provided by the teacher through discussion, interaction, take-home assignments or projects, etc.
2. All practical work will be done through the workshop mode, which has to be participatory in nature.

Drama for Children with Special Needs

For the disabled child, the 'drama' experience is both educational and therapeutic. The creativity of the entire process of drama; using imagination to be 'someone else', integrating dance, music, speech and action, is often 'left out' of the educational experience of the child with special needs. Drama has an immense potential to break through our stereotypes about what a disabled child can or cannot do.

Developing a script/production in which their abilities can be used at full stretch is the first challenge. How does one bring together children who are wheelchair-bound, have restricted mobility (due to spasticity or orthopedic dysfunction), or suffer from visual impairment, speech defects, limited attention/retention span, etc. on the same platform and still make it a worthwhile experience for the audience? Choosing a story with animal characters usually works best, allowing the wheelchair to be 'transformed' into flower petals or the wings of a bird ...providing opportunities for those who cannot speak to dance or move in their own way to the music, and giving simple dialogues to those who can master and deliver it with sufficient 'chorus' lines for all to pitch in!

First, one has to break the story into small sections that can be explained and repeated section by section to the participants, so they can get familiar with characters, situations, and the sequence in which they follow. The limited experience of the disabled child must be kept in mind. Not all of them are even familiar with the different animals and birds of our country—so an educational input is needed for this as well. Only now can rehearsals begin.

It is better to rehearse small sequences separately so that they can be totally mastered by the cast before moving onto the next sequence. Slowly, over a period of eight to nine weeks, will the play begin to emerge and children will be happy to repeat and add onto the action. Also, humour, both physical and verbal, is an essential ingredient of a children's play. By the day of performance they would all be geared up, as this is often their first experience on stage and they would all be eagerly awaiting it!

Curriculum for children with special needs would focus on those learning goals which can easily be achieved. Different dramatic modes and activities should be used keeping in view the respective disability of each child.

For physically challenged children

- Narration, story-telling, and speech-related activities
- Sound and music
- Puppetry
- Formal drama with clear plan and instructions

For visually challenged children

- Narration, story-telling, and speech-related activities
- Sound and music
- Playing musical instruments

For emotionally disturbed and neurotic children

- Role-play
- Improvisation
- Music and movement
- Preparation of masks and puppets

7.2 MUSIC

7.2.1 Upper Primary Stage

Objectives

- To develop an appreciation for music through knowledge of different notes and rhythm (*tala*)
- To distinguish different styles/forms of vocal and instrumental music

Content and Methods

At the upper primary stage, students should be able to develop a sensitivity towards musical forms, both vocal and instrumental. A thorough knowledge and understanding of *shuddha* and *vikrit swaras*, and ability to sing a few *alankars* should be taught. Students should be taught compositions based on *ragas*, i.e., *chhota khayal* in vocal music and *drut gat* in instrumental music. Also Carnatic music should be taught according to capacity of the teachers and students. Community songs, folk songs, songs of national integration, devotional songs, etc. can be taught. Learning traditional songs or instruments from members of family and community and performing it in the class may be encouraged. All the children should be given opportunity to enhance their performance and participate in different activities, i.e., group singing, orchestra, duets, trio, etc. may be encouraged at this level which may be developed by the students.

Music should not be restricted to the conventional system and should have a lot of scope for innovations. The children should be made aware of the various contemporary musicians, vocalists, and instrumentalists. Through various activities and projects, students at this stage should be encouraged to make a pool of information about different artists, collect their photographs and biographies, etc. and display them in the classroom. Teachers teaching at this stage should explore the possibility of involving musicians of their community/region. Audiovisual material may be used and the teacher should be able to teach students the basics of classical vocal and instrumental music, which should also be made available to them.

7.2.2 Secondary Stage

Music will not only lighten the burden of curriculum on children but also reduce the conflicts their mind and give them opportunities to bring out emotions from inside. Creative expression through music enables students to maintain emotional balance and harmony due to enhanced aesthetic values developed in them. At this stage, the subject becomes a discipline/stream, which the child can pursue for higher studies. This is a crucial stage for linking school education to higher education. Music teaching at this stage should be linked with college education.

At this stage, theory and practice of the subject become equally important. A historical perspective of the traditional musical forms needs to be developed. In theory, students should be able to define different terminologies of the subject with a clear understanding.

Objectives

Content and Methods

At this stage, a basic sense of classical music can be developed through *tal*, notation system, and singing and playing. The *ragas* and *swaras* are patterned in such a way that students should be able to recognize the qualities of a *raga* and the part played by its *swaras* at this stage.

7.2.3 Higher Secondary Stage

Objectives

Content and Methods

Vocal: melody instruments (sitar, sarod, guitar, violin, flute, etc.)
Theory: *shruti, swar*

- Working knowledge of the notation system
- Classification of musical instruments
- Contributions of musicians and their biographies
- Project work

7.3 DANCE

The teaching of dance as part of the formal curriculum provides a number of distinct advantages, which are probably encountered only in Indian system of dance practice.

Since classical dance is an aesthetic culmination of movement, music, expression, literature, mythology, philosophy, rhythm and fractions, *yoga* and *sadhana*, if properly taught, it can give many advantages and, in fact, can be a corrective method for many of the problems currently being faced in the formal education system. Some of these advantages are:

- Dance provides complete awareness of the body—how to stand, how to breathe, how to hold the spine, how to walk, etc.
- Dance enhances the sensitivity of a person. In a society where feelings have been mostly suppressed and modes of expressing them have been very few, dance is a natural way of expressing human feelings and creating harmony within and without.

- Dance improves concentration, mental alertness, quick reflex action, and physical agility. It also helps in relieving stress.
- Through dance training, memory sharpens. It is through dance that one discovers that the body also has its own memory. The mind has to be trained in a manner to memorize the movements of the body.
- Its relation with the other arts gives a broader dimension to the mind. No art can be nurtured in isolation. Every art has reflections of some other art. Dance also has music as an integral part, and poetry, painting, and sculpture are also closely associated with dance. So the learning of dance is not restricted to just body movements; it is a complete experience of the understanding of our cultural heritage.

7.3.1 Upper Primary Stage

Learning Objectives

- To gain practical knowledge and basic understanding of different classical dance forms and acquaintance with them through movements
- To develop an eye for aesthetics
- To develop the overall personality through body and mind coordination
- To understand the cultural and literary heritage in brief

Contents and Method

Students should know the definition of classical and be able to differentiate between the classical and regional dance forms. They should be able to identify all the seven classical dance forms of the country geographically, describe each of them, their history, and costumes. At this stage, students should get familiar with simple terms of dance, such as *rasa*, *hasta*, *abhinaya*, etc. They should also be able to develop aesthetics through experiences such as attending dance performances and visiting dance institutions in the locality to understand the process of learning. Students can also visit nearby monuments, museums, and temples and write about the dance forms reflected in them.

During the upper primary stage, mythology including stories from *Panchtantra*, *The Ramayana* and *The Mahabharata* can be introduced. Imaginative themes can be adapted using simple dance movements and music.

7.3.2 Secondary Stage

In the curriculum of secondary education, one of the art education subjects will be compulsory for all the students for a period of two years. The dance curriculum should include both theory and practice in the ratio of 30:70.

Learning Objectives

- Building on the knowledge of basic dance forms, which have been introduced earlier
- Familiarity with the musical components of dance forms
- To develop an overview of the allied areas of the dance forms, such as knowledge of instruments, accompanying techniques, costumes, stagecraft, concert and audience etiquette, aesthetics, etc.

Practical

- Basic footsteps, positions, hand movements, and *mudras* of the chosen classical dance form and their usages
- Understanding of rhythmic time cycles
- Simple combination of dance

Theory

- A brief history of the classical dance forms of India and the regions they originally belong to
- Introduction to Bharat's *Natyashastra*
- Life sketches of well-known dancers and musicians

Projects

Projects may include watching a full-length live classical dance performance and discussing it subsequently in the group.

7.3.3 Higher Secondary

Objectives

- To make an in-depth study of the chosen dance form
- To be able to articulate and communicate about the dance to laypersons using the dance vocabulary

Content

At this stage, the student should focus on a detailed study of the chosen dance form (*nritta, nritya,* and *abhinaya*) and also the literary texts pertaining to it. Elements of stagecraft, such as acoustics, lights, sets, costumes, make up, etc., can be introduced. Familiarity with musical instruments associated with the dance form is also desirable.

Practical

- Learning the fundamentals of the traditional dance forms
- Understanding the musical formats associated with the dance form and the accompanying instruments

Theory

- Detailed study of the *Natyashastra* and introduction to *Abhinaya Darpana*
- Familiarity with poets and their works associated with the respective dance forms

Project

- Presentation by each student through lecture demonstration
- A dissertation/documentation based on an experience/interview with an exponent of dance
- Study of other trends in dance such as modern dance, experimental dance, etc.

- Introduction to teaching of dance
- Attending performances of various dance forms

7.4 TIME ALLOCATION

Pre-primary stage

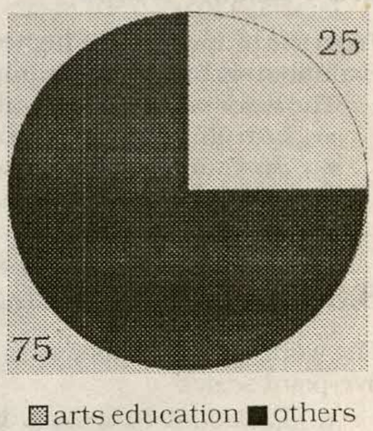
In pre-primary classes, usually, the total duration of working is four hours five days a week. Although the entire curriculum will be transacted through art forms, at least one hour each day should be allocated for experiential practice of the art forms.

Primary and Upper Primary Stages

For classes I to V

- 2 periods a week for drawing, painting, and sculpture
- 2 periods a week for craft
- 2 periods a week for music
- 2 periods a week for dance
- 2 periods a week for drama

For activity-based subjects such as arts and crafts, schools should allocate block periods, which is two periods of 40–45 minutes each. On an average, schools have 40 periods per week (at the primary stage) and 48 periods (at the upper primary stage), out of which one-fourth should be allocated for art education.



Secondary Stage

During the secondary stage, art education as a compulsory subject requires equal time distribution as for other subjects. At least six periods (three block periods) should be allocated for practical activities and one period should be allocated for theory.

Higher Secondary Stage

At the higher secondary stage, art education as one of the compulsory subjects requires at least eight periods (four block periods) for practical activities and two periods for theory. Time could also be allocated in the form of half a day everyday for art and crafts. This time could be used for workshops, *melas*, community projects, etc.

8. EVALUATION IN ART EDUCATION

Evaluation

- No examination
- Process oriented
- Criteria based
- Non-competitive
- Continuous and compressive

It has been suggested that evaluation in art education has to be conducted periodically to assess the progression of the child's performance and this evaluation has to be done on a non-competitive, non-comparative basis. The vertical growth of the child's performance is what needs to be assessed. The evaluation criteria will be developed for different stages, for which a broad guideline is provided here.

8.1 PRE-PRIMARY STAGE

At this stage, usually evaluation takes place in the form of descriptive reporting of an overall progress and behaviour of the child. At this stage of education, usually language, numbers, and simple ideas about life are taught through art forms. Thus, participation of the child in all the activities during four hours of schooling should be assessed. It is advisable that teachers emphasise free expression and creativity throughout the year and also assess the child in terms of his/her own progress rather than judging him/her as compared to other children in the class because competition kills creativity among the children. They need more encouragement than competition for self-development.

8.2 PRIMARY STAGE

From the primary to the higher secondary stage, the process is very important and the evaluation is to be done throughout the year.

The work of children should be assessed on a three-point scale (in every term)

- Learning to observe (observation)
- Spontaneity and free expression
- Interest in participation in different activities
- . Group work participation of each child

8.3 UPPER PRIMARY STAGE

The work should be assessed periodically and reflected in the report card (on a four/five-point scale):

- Participation of students
- Social interaction
- Understanding and development of sensibility of basic elements/principles of art and design
- Proficiency in handling the medium used
- Experimenting in different mediums

8.4 SECONDARY STAGE

Evaluation is a continuous process with grades from each term:

- Six complete works by the end of two years
- Internal assessment before board examinations on all the work done during the two years IX and X (50 marks).
- Assessment by external examiner (50 marks) to be done after seeing exhibition of complete works and examination work (six-hour paper) in consultation with the internal examiner

8.5 HIGHER SECONDARY STAGE

Formal evaluation (on a five-point scale) with marks assigned as in case of other subjects:

- Submission of portfolio
- Process orientation
- Proficiency in handling the medium
- Accuracy in observation

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1. Refer to Evaluation from writing team paper

- Expression of the student's individuality
- Adequate depiction
- Accuracy in depiction/ sketching of objects

9. ART EDUCATION AND TEACHER EDUCATION IN INDIA

Teachers play a very significant role in the early life of a child. After parents, teachers are the adults with whom the child starts interacting at a very early age (probably at the age of three years onwards) and this is the stage of foundation of the child's learning and behaviour upon which he/she builds his/her future. While talking about the profile of the child in a curriculum, it is equally important to consider the profile of a teacher, teacher education, and the capacity building of teachers in India in the present scenario.

There is a strong need for revamping teacher education and capacity building for teachers in the country because the teacher is the key person who has to transform the curriculum and then transmit it in the classroom. Since the curriculum of art education at the pre-primary and primary stages has been largely integrated with the teaching of different subjects, the art education component in the teacher education and training—both pre-service as well in-service—needs to be adequate. Since a large number of schools have one teacher to teach a class in the primary stage, the teacher should apply teaching–learning methods of various visual and performing art forms to be more innovative and creative. It is essential that teachers themselves are creative enough to create interest among children to be more creative. (The other National Focus Group on Teacher Education will be consulted for more suggestions and advice on this issue.)

Upper primary stage onwards, there is a need for teachers specially trained in imparting art education. The concern here is of lack of trained teachers in the schools for art education like TGTs and PGTs for teaching other subjects, such as language, mathematics, social science, and science. The art teacher may be a trained artist, but none of the colleges/universities having four-year degree course in music, fine arts, dance, or drama trains teachers. Students who wish to opt for teaching the arts as a profession need to be trained as teachers for at least one year, during which they can learn different pedagogical issues, methods, and approaches of teaching–learning and evaluation.

During the 1960s, RIE Bhopal and Ajmer conducted one- and two-year courses for fine arts and industrial crafts, which were later on discontinued. In today's time, when there is more scope for professions related to visual and performing arts and more schools can offer art education at secondary and higher secondary stages, trained art teachers are all the more necessary.

It has been largely observed that artist teachers in the schools only teach students to copy their style instead of encouraging them to be creative and develop their own styles of expression. Here, the group has three major suggestions:

- To increase the component of art education in teacher education for various stages
- To conduct extensive teacher orientation programmes for in-service teachers
- To develop a one-year course for art education teachers after completion of their professional degree/diploma in any of the visual or performing arts and before they become teachers

To increase the components of art education in teacher education for different stages, the Group has following suggestions:

After higher secondary education, a two-year training programme makes candidates qualified for primary teaching, but this is a very short period for understanding the arts and will give only a cursory knowledge. So, schools must get resource teachers two or three times a week for the primary level.

For primary teachers, it is important to teach concepts of all subjects through art forms. This needs to be imbibed in the teacher education in such a way that the teacher herself becomes creative and innovative in teaching drawing, painting, paper cutting, mask making, role-play, improvisation, singing, playing instruments, body movements, and facial expressions, and other art tools that can be used by the primary teachers in classrooms.

In the teacher education curriculum for upper primary and secondary stages, aesthetics and appreciation of art and film should be included. The teacher should be able to use art forms as a teaching tool for teaching various subjects.

9.1 CASE OF B. EL. ED., UNIVERSITY OF DELHI

I Year (1998-99)

Practicum courses

PR 1.1	Fine Arts/ Performing Arts
PR 1.2	Craft/ Participatory work
PR1.1	Performing Arts

Individual Work

- Narration/speech
- Mime and movement
- Role play
- Improvisation
- Poetry and music

Group Work

- Sound and movement
- Role-play
- Improvisation
- Group singing/chorus
- Group mime—with/without theme
- Writing stories/plays
- Preparing plays

Warm up Exercises and Games

- Stretching—flexibility
- Breathing
- Mirroring
- Faith—pushing, lifting, diving
- Space
- Sense
- Balance
- Body postures
- Machines

Games

- Eye contact
- Fish ball
- Freeze
- Making alphabets
- Making stories from word chains
- Making stories from objects
- Changing stations
- Blindfold and making chains (blindfold)
- Whisper a word (pass)
- Blinking eyes
- Pass a clap
- Observation
- Word game (be quick)

I.W.—devote 1–2 sessions on each of the activities.

G.W—1–2 sessions depending upon the progress shown by students.

Prepare a few dramas from school texts—Hindi/ English/ Social science.

Content of Drama in Teacher Education: B. Ed.

A. Introduction to theory familiarizing with Indian theatre, various folk forms, Greek theatre, and Sanskrit drama. Students should be encouraged to read a few classics like *Oedipus Rex*, *Mrichhakattikam*, *Shakuntalam*, and stories from *The Mahabharata* and *The Ramayana*, and to watch stage production of reputed theatre groups or companies.

B. Dramatic moves: notation and story-telling, drama games for concentration, observation, and imagination, and exercise for balance, use of space, language and expression coordination, etc.

C. Speech-related activities: conversations, notation of stories or episodes, building up story with an idea or object, story theatre—reading story/poem/piece of prose with two or three different characters.

D. Sound and music: creating sounds with one's own use of body, playing orchestra with a combination of sounds (group) in rhythm—use of clappers, hands, whistle, stick, etc. (local resources).

E. Mime and movement: mime with recorded music and own sounds, introduction to pantomime.

F. Role-play: playing low- and high-status roles with fantastic, real, and imaginative themes.

G. Improvisation:
   a) simple improvisations based on situation of daily life, human relations, nature, and surroundings
   b) improvisations based on objects, costumes, and properties
   c) improvisations on characters/situations like
      - a mother who lost her child in a natural disaster (earthquake, tsunami, etc.) or war
      - a girl who cowed not be sent to school after primary years
      - a group of boys trying to find a treasure in a haunted hous
      - children playing in a garden

- life at a railway platform
- an evening in the local bazaar or *mela*
- preparing for the arrival of a guest in one's school/home

d) playmaking for young children: dramatic structure and the terms used in it, viz., plot, character, prologue, epilogue, conflict, dialogue, monologue, arts, climax, scenes, tragedy, comedy, etc.; supportive sound and music effects, light effects and special effects, etc. to set the mood of the play; exposure to a full length play reading and also its staging by a group/company

e) preparing a short play based on at least two stories, one taken from the folk section and the other a modern story

H. Masks and puppetry: simple paper mask and puppets—glove and hand puppets, finger puppets, preparing puppets from leftover materials at house, such as sweater, socks, T-shirt, rags, etc.

I. Simple stagecraft: set designing, costumes and props, light designing, and special effects

Move of teaching drama: Drama/theatre is a performing art; hence, essentially the methodology of teaching drama is participatory, leading students to form their own questions, explore their own imaginative worlds, find their own areas of interest, and develop accordingly with the guidance of teachers. Students should be free to participate in all dramatic activities and create energy within them for serious drama. Group sensitivity needs to be developed by the teacher in the early part of the course through continuous sharing exercises, the knowledge of the self, and understanding of one's own sensitivity.

Here, the teacher's role is manifold as the learning process involves a lot of experimentation. The teacher is a guide, enabler, motivator, manipulator, facilitator, and teacher as part of a whole group. The methodology of teaching drama involves the 'workshop mode', which is based on the principle of 'self-learning'. The theory part should be interactive in nature, where free atmosphere is provided to students to explore and develop their own understanding through the available resources of books and journals. Imposition and forced discipline should not be exercised; rather, students should be given complete freedom to bring out their hidden potential through self-observation and self-discipline. Students should be encouraged to write their own experiences and feelings in a self-reflective journal and assess their won growth on a daily/weekly basis.

10. STRATEGIES FOR IMPLEMENTATION

There are different stages of implementing art education, such as bringing in art education into the main curriculum of school education, its acceptance by different stakeholders, and its being imparted effectively in schools, which need to be reviewed. There is a need to develop a stage-wise curriculum and detailed syllabi, teaching–learning material, evaluation criteria, extensive pre-service and in-service training for teachers, and guidelines for schools on developing infrastructure. There is also a need for sensitisation of the stakeholders—the state directorates, examination boards, education department, school management, principals, teachers, and parents. Sensitivity towards the subject will enhance the quality of education.

The curriculum framework developed by the NCERT will provide a broad guideline to different states about learning–teaching objectives and content and methods of teaching visual and performing art forms at different stages of schooling. To make the curriculum implemented successfully, various strategies have to be adopted at different levels: states, examination boards, education departments, directorates, school management, school principals, teachers, and parents.

10.1 INFRASTRUCTURE

All schools should have the basic facilities to provide art education, which will include trained teachers, resources to provide basic materials, separate space for conducting visual and performing arts.

10.1.1 Classroom Organisation

In an ideal situation, schools should have rooms especially allocated for activities related to both visual and performing arts. Activities related to art education need space where students can spread their work, sit at ease, and interact with the teacher. A carefully planned, fully stocked, and well-equipped art room contributes more effectively in art teaching. Some schools have separate art departments, as art departments require several rooms. Some even have separate exhibition halls or display areas. On the other hand, in some of the schools, classrooms are converted into art rooms during the allotted art periods. Students may be encouraged to consider the classroom space as their own, decorate it, and take the responsibilities for maintaining it. An art room or a music room or a hall for theatre is a must in schools. It should have illustrations, bulletin boards, space for storage, display area, working area, slide projection facility, computer, etc.

The number of students in a classroom should be limited and manageable. This permits the teacher to pay personal attention to every student. If the class is large, it is advisable to divide them into different groups. This will enable the teacher to supervise them group-wise. The physical arrangements in a classroom for any particular subject are dictated by the activities to be carried out.

The arrangements in the music/dance room should be done on similar lines. In an ideal situation, schools should have a separate room for music, where the musical instruments, such as Tabla, Sitar, Tanpura, etc., may be kept for use by the students. The room can also be used for theatrical practice as well as dance. Since singing produces higher volume of sound, especially when a group is singing or playing instruments, it requires either a soundproof room or a room located in one corner of the school building. The sitting arrangement has to be made on the floor to accommodate the whole class. Whether the room/hall is used for visual or performing arts, schools should have a corner of bookshelves, containing books on arts forms, artists, etc., which should be accessible to students.

10.2 PRACTICES IN CLASSROOM AND OUTSIDE

Some strategies for classroom and outside-the-classroom practices have been suggested for the schools and teachers. Teachers should try to conduct group activities so far as possible. This will enable children to share their resources and a sense of cooperation and sharing will develop among them. Students right from the pre-primary to secondary stages should be given opportunity to keep their classrooms clean, display charts, posters, and paintings, etc., which should keep changing at regular intervals. Display of students' works encourages them to work more. Teachers, including the class teacher, art teacher, and subject teachers, should give opportunity to all children to display their works.

Using Local Resources

Looking at the socio-economic and cultural diversity of the country, it would be all the more essential for schools, parents, and teachers to be able to use the local regional arts and craft traditions in the developmental stages of school education. As mentioned earlier in this paper, we need to protect our diverse culture and prevent the local and regional practices from merging into one homogeneous culture. Children are required to be made aware of the uniqueness and diversity of their own surroundings and environment. All the schools should provide their children opportunity to work with the community beyond the four walls of the school. Almost all the cities, towns, and villages in India have local arts and crafts traditions, monuments, etc., around which the children can construct their own history. Artists, artisans, and performers may be called to the school, or they can be employed on part-time basis by the schools to teach the art forms. Teachers in the school should help build a small library or archive of materials, posters, books, charts, audio-visual materials, etc., which can be used and managed by the students. Teachers with the help of students can also develop materials for display.

Workshops to be Organized Frequently

Schools may regularly organize workshops for a week or fortnight, where local artists can be invited to interact with the students and teach them the arts or crafts. Workshops on theatre, music/singing, making a musical instrument, pottery, leatherwork, folk dance, animation, and so on can be arranged for students' experiential learning. In these workshops, children and teachers from neighbouring schools can also join. Workshops may also be conducted at the artists' workplace. Workshops can also held be for conservation of the cultural heritage or study of a monument.

Classroom Interactions

It is essential for teachers to interact with students regularly by asking them about their interests and what they would like to do in the classroom rather than being prescriptive all the time. Knowledge sharing is another method to make the child feel important when he/she can share her/his experiences or works with other students in the class. Teachers too should share their learning experiences with children and participate in different activities. Teachers should also share their classroom experiences with other teachers in the school as well as teachers of other schools. Art teachers of different schools can also have a forum to share their experiences for better teaching–learning and evaluation practices.

11. RESOURCE MATERIAL FOR ART EDUCATION TEACHERS AND SCHOOLS

Schools should maintain a small library having reference material and publications from different government and non-government organisations in printed and audio-visual media on various art forms. These may include teachers' handbooks, audio and video cassettes, CD-ROMs, films, etc. depending upon the resources available. Schools can also build small resource centres, which they can share with the community, or archives where different material collected by students may be kept. This resource centre or library or archive should be accessible to all the students. Here, we have tried to give some of the materials developed by different institutions.

NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING

- *Teachers' Handbook of Art Education, Class VI*
- *Let us Sing Together: Aao Mil Kar Gayen, 1999 Education*
- *Sangeet Ka Lahrata Sagar, Vishnu Digambar Paluskar* (Hindi)
- *Hindustani Shastriya Sangeet Ke Pramukh Kantha Sangeetagya* (Hindi)
- *Uttar Bharatiya Shastriya Kantha Sangeet: Ek Adhyayan*
- *Raja Ravi Verma* (Hindi)
- *Ek laya ek Tala* (Hindi)
- *Kala Shiksha Ki Shikshak Sandarshika* (Class V)
- *Fun with Art and Crafts*
- *Research Studies and Monographs—Orchestral Harmony*

CENTRAL INSTITUTE OF EDUCATIONAL TECHNOLOGY

Audio-visual material on visual and performing arts

NATIONAL BOOK TRUST

• *Contemporary Art in India. A Perspective*	(Pran Nath Mago)
• *Indian Folk Arts and Crafts*	(Jasleen Dhamija)
• *Indian Painting*	(Sivaramamurti)
• *Temples of North India*	(Krishna Deva)
• *Temples of south India*	(K.R. Srinivasan)
• *Tribal Life of India*	(N.K. Bose)
• *All About Photography*	(Ashok Dilwali)
• *Art: The Basis of Education*	(Devi Prasad)
• *Shiksha Ka Vahan: Kala*	(Devi Prasad)
• *Low-Cost/ No-Cost Teaching Aids*	(Mary Ann Dasgupta)
• *Rabindranath Tagore: Philosophy of Education and Painting*	(Devi Prasad)
• *Hindustani Music*	(Ashok Ranade)
• *Musical Instruments*	(B.C. Deva)
• *Performance Tradition in India*	(Suresh Awasthi)
• *Bengali Theatre*	(Kironmoy Raha)
• *Creative Drama and Puppetry in Education*	(R. Contractor)
• *Ancient Indian Costume*	(Roshen Alkazi)
• *Flowering Trees*	(M.S. Randhawa)
• *Himalayan Travels*	(Ram Nath Pasricha)
• *Hindustani Music*	(Ashok Da Ranade)
• *History of Gujarati Theatre*	(Hasmukh Baradi)
• *Tansen: The Magical Musicial*	(Ashok Davar)

CENTER FOR CULTURAL RESOURCES AND TRAINING

Audio-visual Materials

- Odissi Dance, Part 1 and 2
- Ramayana: Balakhanda
- Bharatanatyam Dance, Part 1 and 2
- Seraikella Chhau
- Nati Dance–Himachal Pradesh

- Purulia Chhau
- Mask Dances of West Bengal
- Folk Dances of Sikkim
- Jaisalmer: The Golden City
- Poetry on Walls: Vishnupur Terracotta Temples
- Weaving Tales of Cloth: Baluchari Sarees
- Agra Fort (World Cultural Heritage Site)
- Agra Gharana, Part 1 and 2
- Karinga: Land of Rising Sun
- Raas Manipuri dance
- Khajuraho (World Cultural Heritage Site)
- Churches and Convents of Goa (World Cultural Heritage Site)
- Mahabalipuram (World Cultural Heritage Site)

Audiocassettes

- Azaadi Ke Geet (Songs of Freedom Movement)
- My Pledge to Freedom
- Regional Songs, Part 1 and 2

Colour Slides

- Slides on performing arts
- Slides on plastic arts

Cultural Packages

National Symbols
  - National Flag (Tiranga)
  - National Anthem (jana-gana-mana)
  - National Song (vande mataram)
  - National Animal (tiger)
  - National Bird (peacock)
  - National Flower (lotus)
  - National Calendar
  - National Emblem (Ashoka Chakra)

- Forts and Palaces of Madhya Pradesh
- Fatehpur Sikri 1 and 2
- Textile Designs 1 and 2
- Forts, Palaces and Havelis of Rajasthan
- Purulia Chhau
- Traditional Toys
- World Cultural Heritage Sites— India 1, 2, 3 and 4
- Art of Puppetry, 1 and 2
- Kuchipudi Dance
- Bharatanatyam Dance
- Manipuri Dance
- Kathakali Dance
- Kathak Dance
- Odissi Dance
- Expressions in Lines

- Musical Instruments of India 1 and 2
- Architecture of Delhi
- Cultural History 1, 2, and 3
- Forts of Maharashtra
- World Natural Heritage Sites - India 1 and 2
- Traditional Theatre forms of India – 1 and 2
- Reports and Books
- Kumbh City Prayag
- Teeratharaj Prayag
- National Seminar on Culture and Development

Publications Division

- *Basohli Painting* (M.S. Randhawa)
- *Buddhist Sculptures and Monuments* (Publication Division)
- *5000 Years of Indian Architecture* (Publication Division)
- *Folk Metal Craft of Eastern India* (Meera Mukherji)
- *Indian Classical Dance* (Kapila Vatsyayan)
- *Living Dolls: Story of Indian Puppets* (Jiwan Pani)
- *Looking Again at Indian Art* (Vidya Dehejia)
- *Madhubani Painting* (Mulk Raj Anand)
- *Natarajan in Art, Thought and Literature* (C. Sivaramamurti)
- *Panorama of Indian Painting* (Publication Division)
- *Selected Surrealistic Painting* (National Gallery of Modern Art)
- *Some Aspects of Indian Culture* (C. Sivaramamurti)
- *The Eye in Art* (Dr. Rajendra Vajpai)
- *Wall Paintings of The Western Himalayas* (Mira Seth)
- *Dance Legacy of Patliputra* (Shovana Narayan)
- *Indian Cinema–A Visual Voyage* (National Film Development Corporation)
- *Indian Classics: Malayalam* (G.S. Iyer)
- *Indian Muslims: Festivals and Customs* (Dr Majda Asad)
- *Musical Instruments of India* (S. Krishaswami)
- *The Language of Music* (V.K. Narayan Menon)
- *Documentary Films and Indian Awaking* (Jag Mohan)
- *Films Division and the Indian Documentary* (Sanjit Narwekar)

12. REFERENCES

- Learning Without Burden
- National Curriculum framework for School Education 1975
- National Curriculum framework for School Education 1988
- National Curriculum framework for School Education 2000
- National Policy on Education 1986
- Programme of Action on NPE 1992
- A Practical Guide for Teaching K-12 Visual Arts Edited by John A. Michael, 1993
- 'Design for Learning through the Arts' by Prabha Sahasabudhe, presentation of paper at IIC Asia, Project UNESCO and Center for International Art Education Symposium IIC, New Delhi.

Reports

Yashpal Committee Report, 1993
Kothari Committee Report, 1966

Report of the Secondary Education Commission, 1952-53

NCERT Committee on Improvement of Art education, 1966

HERITAGE CRAFTS

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EXECUTIVE SUMMARY

Review of the National Curriculum for School Education.

The Focus Group Objective:

To incorporate the cultural, social, and creative attributes of craft into the educational system, through both theory and practice.

To ensure that craft is viewed as a professional skill, leading to employment opportunities.

Why Heritage Crafts in the School Curriculum:

One out of every 200 Indians is an artisan. Hand craft is a production process and a wonderful, indigenous technology, not an outmoded tradition.. This point needs to be emphasized in the school curriculum, and craft be taught as a professional expertise rather than a "hobby".

Training in craft skills, whether at home, or through the traditional Guru-Shishya tradition, should be recognized as industrial training, and given the same supports as other technical and vocational education.

Craft skills should be on par with other vocational training, especially in traditional crafts pockets, part of a properly structured curriculum.

In areas where craft is the primary activity, children should be able to opt for craft as a course option, offered as a specialized stream in itself, learning ancillary skills like product design, book keeping, display, merchandising and entrepreneurial skills.

Craft can teach:

- Consideration of relationship between the student and his/her environment and the inter-dependence of the two.
- Societal skills – tolerance, understanding and appreciation of difference as a means of enriching their world. It includes the means of empowerment for so-called marginalized groups.
- Information processing skills – how to locate and collect relevant information, compare, contrast, analyze relations between the whole and a part.
- Reasoning skills – give reasons for opinions, use precise language to explain.
- Enquiry skills: ask questions, plan activity, improve ideas
- Creative skills – Expressive arts, explore different ways of personal expression and involvement in school projects and with business. Entrepreneurial skills create an attitude allowing people to enjoy change, practice risk management and learning from mistakes.
- Work related culture.

The Focus Group concluded :

- That Indian craft and its millions of practicing craftspeople are a huge and important resource of traditional knowledge and indigenous technologies.
- That this resource could be used to value-add to the educational system in a number of ways.
- That craft should be taught both as a vocational, creative activity and as a theoretical social science.
- That craft should not only be taught as a separate subject in its right, but be integrated into the study of history, social and environmental studies, geography, arts and economics, since it is an integral part of Indian culture, aesthetics, and the economy.
- That craft is particularly suited to value-add to projects of all kinds – as an illustrative teaching aid, and as a learning device.
- That experiencing and working hands-on with a craft medium can lead to learning that is useful and enriching; whatever discipline or profession a child may eventually chose. Working with your hands, materials, and techniques helps you both in understanding processes and in problem solving.
- In IITs and technical institutions abroad, model making and origami are used to teach the fundamental of engineering, mathematics, and physics
- That craftspeople themselves should be used as trainers and teachers, rather than training another cadre of crafts teachers.
- That craft are taught as a lively, experiential exercise, and not as a revivalist lip-service to the past.
- That craft is best taught as a project, rather than a classroom exercise.
- Crafts projects and interactions could be a means of linking rural and urban youth.
- Craftspeople used as resource persons or trainers should receive the same remuneration and status as other trained professionals.
- That different curricula could be developed for schools in rural craft pockets where craft education could enhance existing craft vocations (Entrepreneurship, technical training, language skills, accountancy, marketing, packaging). and for schools in urban belts, where education in craft would constitute an alternative experience and a creative outlet.
- That aspects like gender, environment, community, caste could not be left out of the teaching of craft.
- Craft could also be a valuable entry point and asset in other careers - export, museum curators, teachers, NGO sector.

Tools and Infrastructure Required:

- A pool of craftspeople trained to impart basic knowledge.
- Trainers/teachers from diverse backgrounds interested in the subject.
- One person in school who would coordinate inputs, projects, external trainers, craft demonstrations, field visits
- A craft lab with space, facilities and raw materials.

Resource material Required

1. Craft Mapping of India
2. regionwise listings of craftspeople/crafts Institutions
3. Monographs on Craft
4. Films, and other visual material
5. Manuals/Handbooks on different techniques, skills, materials
6. Separate criteria for crafts people.
7. Skills to work in group
8. Having/making a space for teaching in motivation.
9. Restarting the technology and product
10. Co-relation between various Govt. agencies

Resource people and institutions who could be tapped for help:

Indira Gandhi Manav Sangrahalay, CCRT, Eklavya, INTAC, Fabindia, Bharati, Jaya Jaitley, Mapin, Shantiniketan, CBT, NCERT, Films Division, The Khadi & Village Industries Corporation, National Book Trust, Dastkar, National Institute of Design, National Institute Fashion Technology, Crafts Museum, National Museum, Calico Textile Museum, Bal Bhavan, Bharat Bhavan, SPIC-MACKAY, SASHA, Crafts Councils of India, Craft Institute, Jaipur, Weavers Service Centres, DC Handicrafts & Handlooms Offices, Govt Design Cells., Handicrafts & Handlooms Export Corporation & Central Cottage Industries Corporation, Dilli Haat, Crafts Revival Trust, Shri L.C Jain, SANSKRITI, Dakshinchitra.

Art and Craft: It was the recommendation of the Group that these two subjects should be merged, rather than bifurcated, and Indian craft skills and materials be used to develop the creativity and artistry of the child, in conjunction with sketching, painting, etc. Design is a very important component that should be taught as part of both subjects, with students using craft techniques to design their school environment, classrooms, uniforms, etc.

Queries and Concerns:

How will it respond to the aspiration and context of different regions and different social groups?

Does it have the flexibility to provide space to marginalized voices?

How will it deal with issues of diversity and commonality?

Did the term "Heritage" Craft send out revivalist, dated messages to the young?

Ideas for Implementation:

- Craft Labs in all schools
- Craft compulsory in Junior and Middle School, and as an elective major in Senior School, especially in crafts pockets.
- Children should work on projects to create local museums of archiveal crafts, relating it to local history, geographic conditions, flora, fauna, costumes, culture and ritual.
- Annual fair, with children developing and selling products.
- Vacation excursions and camps in craft pockets, working with craftspeople.
- Lecture-demonstrations by craftspeople (parents of school children)

- Puppetry as vehicle of instruction
- Exchanges and shared excursions between rural and urban schools, with crafts children teaching craft.

Respect for the craftsperson and for the art of craftsmanship is the integral aim of the recommendations.

Allied is our awareness that the continuing existence of an extraordinary richness of craft traditions and producers is one of India's unique assets as it searches for its own identity in a world that is increasingly uniform and technological.

HERITAGE CRAFTS

Learning is an integrated event; it is not a separate process.

K. JINAN, DESIGNER AND CRAFT TEACHER

SOME FACTS

- India is home to 16 per cent of the world's population.
- India spends 3.8 per cent of its GNP on education; 46 per cent of its population over the age of 15 is illiterate.
- Since most of the population growth in India is taking place among those who will have the least skills/education when entering the job market, the country is likely to be inundated with either completely illiterate or poorly schooled youth and children.
- With 388 million children under 15 years of age, India faces a major challenge on the educational front.
- Fifty-four per cent of adults in India cannot read or write.
- Craftspeople form the second largest employment sector in India, second only to agriculture. One in every 200 Indians is an artisan.

OVERALL VISION

To impart a rounded and holistic education that equips the Indian youth of today to face the challenges of a global and rapidly changing world, while preserving their own cultural assets, traditions and values.

OBJECTIVES

- To incorporate the cultural, social, and creative attributes of craft into the educational system through both theory and practice.
- To ensure that craft is viewed as a professional skill, leading to employment opportunities.

As someone said, **"Tell me, and I'll forget.
Show me, and I may not remember.
Involve me, and I'll understand."**

Knowledge is an experience, not a formula.

METHODOLOGY

A common charge against Indians is that we have a great ability to visualize dreams but not the corresponding capacity to actually realize them. So we felt it important to develop a range of recommendations that are practical, specific and accessible; that are backed by personal experience, data and guidelines; and that build on the strengths rather than the weaknesses of the system.

WHY HERITAGE CRAFTS SHOULD BE INCLUDED IN THE SCHOOL CURRICULUM

The Focus Group represents a sector of over *20 million* practitioners, with a geographic spread that embraces all of India, and covers a huge gamut of widely differing work structures and cultures, with craftspeople working with widely differing techniques and technologies, using materials that range from clay to precious metals. Craft is the largest sector of employment after agriculture, and one of the largest contributors to the economy in exports revenues as well as domestic sales.

In addition, craft can be used as a means of interpreting many social issues and ways of living. Craft in India is so universally prevalent that it has been used over the centuries as a metaphor for numerous philosophical, metaphysical and social concepts. Many words, forms of measurement, colours, and materials have a craft origin. The *thaana* and *baana* of life is something with which we are all familiar. Caste, gender, religion, and social practice all play significant, varying roles. All these different criteria need to be kept in mind when we strategize. *Can exclusion be transformed into awareness?* There is no generic answer to this question. All that we can attempt to do is create an understanding of the diversity and complexity of the craft sector. The contention of our Focus Group is that *craft—both in theory and in practice—can be a powerful tool of emotional, economic and intellectual empowerment for children at all levels, locations and sectors of school and society.*

Words like *craft* and *heritage* carry a lot of baggage with them. In the Indian context, they are especially emotive. To trendy yuppies in metropolitan areas, they carry connotations of something that is boring, passé and irrelevant; to others, the words evoke images of a 5,000-year-old civilization with rich multiple cultures and traditions to which each of us claims ownership and wants never to change. Some want the heritage clock to stop short at pre-Mughal India; a few recognize that craft never was and never should be static.

Contemporary Indians get terribly excited when an Indian enters space, wins an international beauty contest, or gets a silver medal at the Olympics. Sania Mirza's recent entry into the ranks of the world's best 100 tennis players has us agog. But few appreciate India's unique distinction of having literally millions of master craftspeople still practising skills that are no longer extant in the rest of the world.

Paradoxically, while craft traditions are a unique means of earning a livelihood for rural artisans entering the economic mainstream for the first time, they also carry the stigma of inferiority and backwardness especially at a time when India is entering a period of hi-tech industrialization and globalization. Craft and the ancillary aspects of design and tradition are considered by activists and economists, bureaucrats and business strategists, as decorative, peripheral and elitist, as rather retrograde ways of earning a living. Craftspeople are usually seen as picturesque exhibits of our past rather than as dynamic entrepreneurs of our present and future. We forget that one out of every 200 Indians is an artisan. Hand craft is a production process and a wonderful indigenous technology, not an outmoded tradition. The raw materials used by artisans (cane, cotton, clay, wood, wool, silk, minerals) are not only available indigenously but are also environmentally friendly. *The existence of unique living craft skills, techniques, designs, and products is India's great strength, leading to career opportunities at all levels, not a weakness. This point needs to be emphasized in the school curriculum, and craft should be taught as an area of professional expertise rather than as a 'hobby'.*

To those of us now looking at the new millennium and seeking new directions for India, the potential of crafts and craftspeople is something to which younger generations should be sensitized. Let us not lose sight of the fact that every ten years we lose 10 per cent of our craftspeople.

One of the areas that our Focus Group concentrated on was the specialized stream of education in craft pockets where the bulk of the community consists of craftspeople. In India, the choice is often between a craftsman's child learning ancestral skills (while on the job, and contributing to the family income in the process) while remaining illiterate, on the one hand, or getting a conventional education, on the other hand. Given the very poor levels of rural and state-provided education, this formal schooling might not actually equip him or her for any job in the future.

Training in craft skills, whether at home or through the traditional guru-shishya relationship, should be recognized as industrial training, and should be given the same support as other technical and vocational education.

Craft skills should be considered on par with other kinds of vocational training, especially in traditional craft pockets, and should be a part of a properly structured curriculum, with trainers or parents *paid* to impart the skill, rather than using children as unpaid labour. Equally important is the issue of providing facilities for conventional education alongside those teaching traditional skills; it is important to schedule semesters and school hours according to the work structures and seasonality of craft production. Most young craftspeople do not go to school because school hours and locations make it impossible to avail of both disciplines, that is, craft apprenticeship and formal schooling. Much craft production is usually a seasonal affair, with peaks and lows according to market demands. School terms and curricula should be organized accordingly.

In areas where craft is the primary activity, children should be able to choose craft as a course option. Craft should be offered as a specialized stream in itself, enabling children to learn ancillary skills like product design, bookkeeping, display, merchandising and entrepreneurial skills.

For example, in a handloom-weaving area, the course skills that should be taught are:

- Entrepreneurship
- Money management
- Communication
- Textile design

- Draughtsmanship
- Scale drawing
- History of the craft
- Technical skills
- Exposure to other weaving styles
- Different yarns, counts and looms
- Interaction with other designers, artists and craftspeople

We need to introspect on the steps required to include craftspeople in the mainstream, and take them forward as skilled entrepreneurs and economic partners. We need to create an awareness of and build on the strengths rather than the weaknesses of each craft and craft community. We need to be sensitive to their different nuances and cultural consciousness. Economic considerations may be the driving force, but we need to recognize that social, cultural and familial concerns also shape the direction of the decision-making process. We need to take the craftspeople with us. We need to learn to listen as well as to speak. There must be a shift from patronage to partnership.

Properly regulated, the age-old system of apprenticeship could be developed as an alternative means of education rather than a system of exploitation. **A blanket ban on children learning craft would miss a unique opportunity to create a skilled workforce of potential high earners. It would also miss the opportunity to generate self-employment** in a country with rising unemployment and few employment avenues for rural youth, especially home-based women. **But let me also stress that in my view any child under 15 who is not in school IS child labour.**

Sadly, in the craft sector in India, the choice is often between a craftsman's child learning ancestral skills (while on the job, and contributing to the family income in the process) while remaining illiterate, on the one hand, or getting a conventional education, on the other hand. Given the very poor levels of rural and state-provided education, this formal schooling might not actually equip him or her for any job in the future. In Ranthambhore, the village schoolteacher would report to duty only to sign his daily attendance sheet, and then go off to the forest as a tourist guide!

For me, this is the crucial issue. Not poverty, which is often cited as a justification for child labour, but whether there are alternative educational opportunities available for the child that would give him/her the same employment opportunities. Can child labour be transformed—through legislation, innovative new planning and educational mechanisms—into a vibrant new form of training and empowerment? I must emphasize here that I am looking at the issue today purely from the perspective of the craft sector, in particular home-based traditional industries and those relating to women.

Training in craft skills, whether at home or through the traditional guru-shishya relationship, should be recognized as industrial training, and given the same support as other forms of technical and vocational education. The family, master craftsperson, cooperative society, institution, or NGO imparting the training should receive some stipend so that the child rather than the employer receives any money that he/she may earn during the period. Otherwise, there is the temptation, often succumbed to, of practising bonded labour of children under the guise of imparting a skill—as in the brass industry in Uttar Pradesh and Andhra

Pradesh where the craft has moved from being a family occupation to being an assembly-line mass-manufacturing activity. The carpet industry is another notorious example, though international pressure and legislation have brought about some changes. For example, the Rugmark *Smiling Carpet* campaign, though not perfect in either concept or application, could be one such module used for developing further strategies.

Craft skills should be on par with other forms of vocational training, especially in traditional crafts pockets, and should be part of a properly structured curriculum, with trainers or parents **paid** to impart the skill, rather than using children as unpaid labour. Equally important is the issue of providing facilities for conventional education alongside those teaching traditional skills, scheduling semesters and hours according to the work structures and seasonality of craft production. Most young craftspeople do not go to school because school hours and locations make it impossible to avail of both disciplines. Much craft production is usually a seasonal affair, with peaks and lows according to market demands. School terms and curricula could be organized accordingly.

In a country as diverse and multidimensional as India, there is no one single solution or methodology.

LAILA TYABJI,CHILD LABOUR IN CRAFTS (TRAIDCRAFT WORKSHOP, 2003)

The noted master craftsperson, Ganapathi Sthapati, warned us (apropos of Western vs Indian traditional culture), "If we don't tell them, they will tell us." We could do well to turn this observation on its head and reflect that if we do not listen to craftspeople, a time may come when they will not be around to listen to us.

Shalini Advani, as part of the informal discussion group on the National Curriculum Framework, bulleted eight points on the values that should underpin the National Curriculum. All of these points apply equally well as arguments for the incorporation of craft in the school curriculum:

- It is a means to shape the social, cultural, physical, and mental development of the individual.
- It is a means to seek equality of opportunity for all.
- It upholds and teaches democracy, not in the centralized statist style of the 1960s but in a way that promotes the empowerment of individuals and communities.
- It promotes a productive economy.
- It promotes sustainable development.
- It teaches us to value our identity, our relationships, ourselves, and the wider groups to which we belong.
- It promotes the diversity of our society.
- It values the environment in which we live.

Similarly, Shalini Advani's listing of cross-curricular skills could also form part of our argument for the inclusion of craft in school education:

- *Appreciation of the relationship between the student and his/her environment* and the interdependence of the two.

- *Social skills*: tolerance, understanding, and appreciation of difference as a means of enriching their world. This includes the means of empowerment for the so-called marginalized groups.
- *Information-processing skills*: how to locate and collect relevant information; how to compare, contrast, and analyse relations between the whole and the parts.
- *Reasoning skills*: give reasons for opinions, use precise language to explain.
- *Enquiry skills*: ask questions, plan activities, improve ideas.
- *Creative skills*: Expressive arts; explore different ways of personal expression and involvement in school projects and with business groups. Entrepreneurial skills foster an attitude allowing people to enjoy change, practise risk management, and learn from their mistakes.
- *Work-related culture*.

The Focus Group Consensus is that :

- The inclusion of heritage crafts as a focus area in the National Curriculum Review for the first time is a significant recognition of the importance of this sector.
- This is a unique opportunity to review and impact the educational system in India today.
- The challenge is not only to develop an innovative and meaningful programme but also to ensure its implementation.
- Therefore, the recommendations need to be accessible and adaptable to the situation and resources (human and fiscal) of government schools.
- The recommendations need to address the needs of both parents and children if they are to be accepted.
- In a market-driven society, unless parents are convinced that the curriculum enhances the professional development of the child, they will not support it.
- The universal disillusionment and discontentment, at every level, with the current educational system presents both a challenge and an opportunity to bring about change.

CRAFT-SPECIFIC RECOMMENDATIONS

- That Indian craft and the millions of practising craftspeople in the country are a huge and important resource of traditional knowledge and indigenous technologies.
- That this resource could be used to add value to the educational system in a number of ways.
- That craft should be taught both as a vocational and creative activity and as a theoretical social science.
- That craft should not only be taught as a separate subject in its own right, but should also be integrated into the study of history, social studies, environmental studies, geography, arts and economics since it is an integral part of Indian culture, aesthetics, and the economy.
- That craft is particularly suited to add value to projects of all kinds, as illustrative teaching aids and as learning devices.
- That experiencing and working hands-on with a craft medium can lead to learning

that is useful and enriching, whatever discipline or profession a child may eventually choose. Working with one's hands, and with different kinds of materials and techniques, helps one both in understanding processes and in problem solving.

- That in IITs and technical institutions abroad, model making and origami are used to teach the fundamentals of engineering, mathematics, and physics.

> **"I should be paid more, because I was thinking AND doing."**
> **KALARAKSHA CRAFTSWOMAN, KUTCH**

- That craftspeople themselves should be used as trainers and teachers rather than training another cadre of crafts teachers.
- That craft should be taught as a lively, experiential exercise, and not as a form of revivalist lip service to the past.
- That craft is best taught as a project rather than as a classroom exercise.
- That crafts projects and interactions could be a means of linking rural and urban youth.
- That craftspeople used as resource persons or trainers should receive the same remuneration and status as other trained professionals.
- That different curricula could be developed for schools in rural craft pockets where craft education could enhance existing craft vocations (entrepreneurship, technical training, language skills, accountancy, marketing, packaging), and for schools in urban areas where education in craft would constitute an alternative experience and an outlet for creativity and personal expression.
- That factors like gender, environment, community, and caste could not be left out of the teaching of craft.

SOME EXAMPLES OF HOW CRAFT COULD BE INTEGRATED INTO OTHER SUBJECTS AND PROJECTS

In History

- Example of continuity and change
- Part of people's history
- Role of khadi in the Indian freedom movement
- Homes, costumes, living styles
- Trade in textiles, artifacts and jewellery with the Greek and Roman Empires
- The temple and the court as patrons of the arts
- Karkhanas in the court of Shah Jahan
- Batik and ikat textile crafts, from India to South-east Asia and back
- History of indigo during the British Raj
- The jamewar shawl
- Handlooms and the Industrial Revolution
- Indus Valley Civilization
- Social life interpreted through artifacts

In Geography and Environmental Studies

- Emergence of local craft traditions based on availability of local raw materials
- Use of local materials
- Mineral and vegetable dyes
- Water: use in weaving, dyeing, block printing
- Construction of traditional houses: dictated by availability of stone, wood, bamboo, clay
- Shahtoosh: preservation of species or preservation of livelihood?

In Science

- Origami
- Balance and proportion
- Chemical properties of materials
- Tools and technology
- Firing and casting

In Literature

- Myths: Visvakarma, etc.
- Literary references to handicrafts and handlooms
- Weaving and the loom as metaphysical metaphors

In Classroom Projects and School Activities

- Posters
- Maps
- Masks, costumes and sets for school plays
- Model making
- School decorations
- Paper bags, handmade paper
- Developing school museum of local crafts and artifacts
- Developing school archives of designs, motifs and forms

> **"Skills need to succeed in today's world."**
>
> DR CYRUS VAKIL, CHAIR, FOCUS GROUP ON EXAMINATION REFORMS

CAREERS AND EMPLOYMENT

- Craft skills are unique to India and are at a premium in today's mechanized society.
- The crafts sector is the highest contributor to export earnings.
- The crafts sector is the biggest employment sector after agriculture.
- Hand skills are useful in many professions such as architecture, engineering, design, and fashion.

- Craft could also be a valuable entry point and asset in other careers such as exports, museum curation, teaching, and working in the NGO sector.
- This fact should be highlighted in school career counselling sessions.
- It is important to make parents/teachers understa the commercial potential of craft study.
- It is important to stress the potential of craft as a career, especially in areas with existing craft traditions.
- In such craft pockets, students from craft backgrounds could be taught design, entrepreneurship, management and merchandising to help professionalize their skills.

Case study: Archana Kumari comes from a small village in one of the poorest and most deprived areas of India, Muzaffarpur district in north Bihar. At age 14, she left school and began earning a pittance doing the traditional sujni embroidery of the area. At age 17, her creative skills came to the notice of a local NGO, Adithi, and a Canadian textile expert, Dr Skye Morrison, who together sent her to NIFT (National Institute of Fashion Technology) on a scholarship. Despite being handicapped by her lack of English and other academic skills, Archana regularly topped her class at NIFT, won a prize for the Best Design Collection of her year, and has been accepted at NIFT for further studies on her own merit. She says her hand skills and experience of working hands-on in craft have given her an edge over the other students. Her one regret is that the local school did not give her and other children the early grounding that would have empowered them to be both craftswomen and entrepreneurs.

Gender

"We may be wage earners but we are still walking on someone else's feet. Because we lack the tools of education and language, we are still dependent."

SHIVA KASHYAP, MADHUBANI CRAFTSWOMAN, BIHAR

"His friends laugh at my son because he helps his mother."
Rinjani, embroidery craftswoman, Indonesia (Dastkar, Threadlines Workshop, 1998)

Craft and gender have significant linkages. On the one hand, craft is a microcosm of male–female roles within the family and society. Men and women work together in the different processes of the craft. Women knead the clay and men turn it on the wheel; women spin the yarn and men weave it; women embroider the leather *juthis* and men cut and stitch them. Mostly, this is an unpaid add-on to the multiple roles that women already juggle with within the home.

On the other hand, women have increasingly taken on many craft activities formerly practised by men who have left the sector, becoming empowered entrepreneurs in the process. Chikan embroidery in Lucknow, for instance, is now almost wholly done by women rather than men, as is block printing in many parts of Rajasthan. Over the last two decades, craft has become an increasingly successful source of earning and employment for otherwise unskilled home-based women. This in turn has been a catalyst for many other forms of social empowerment. An awareness of these issues and opportunities should be built into the theoretical understanding of craft as students enter the senior classes.

> **"There should be equality between men and women and all professions should be open to both. But all professions should be respected and craft should be treated as a profession."**
>
> MARIA GARANITO, EMBROIDERER, MADEIRA (DASTKAR THREADLINES WORKSHOP, 1998)

The Dastkar case study of Bal Bhavan, one of the few national-level institutions offering crafts as an extracurricular option, shows that many girls have gone on to use the skills in *mehndi* hand painting, artificial flower making, and tie-dye learnt at Bal Bhavan as home-based professions in later life.

Ecological

> **"Waste is a modern concept."**
>
> TERRACOTTA CRAFTSPERSON, TAMIL NADU
>
> **"Animals begin to learn by exploring their habitat."**
>
> MADHAV GADGIL, CHAIR, FOCUS GROUP ON ENVIRONMENT

Craft is one of the few professions that is a direct result of the natural environment in which it is practised. The existence of the surrounding natural materials—stone, wood, metal, clay, cotton, cane and bamboo, silk, lac—is the impetus of most traditional crafts. *This harmonious balance between man and nature, economic growth and environmental balance, not requiring huge inputs of artificial energy, infrastructure or investment, is what makes craft viable even today.*

In a world increasingly dependent on resources that come from outside, craft has many lessons. However, it should be taught with the warning that most of these natural raw material sources are being rapidly depleted. Forests are being cut down and not replanted; water is being polluted; many grasses and reeds are no longer available. For instance, Andhra Pradesh's famed cotton fields are being turned over to tobacco cultivation.

Issues that need to be debated in the classroom are the ban on ivory, sandalwood and shahtoosh, and how the protection of wildlife and diminishing natural resources impacts people's livelihoods. Therefore, there is a corresponding need for innovative R &D that will find alternative solutions and materials.

> **"The lake where I used to get khus for my ittar perfumes is now the site of a gas factory."**
>
> A TRADITIONAL PERFUME MAKER, SAWAI MADHOPORE

TOOLS AND INFRASTRUCTURE REQUIRED

- A pool of craftspeople trained to impart basic knowledge.

- Trainers/teachers from diverse backgrounds interested in the subject.
- One person in the school who would coordinate inputs, projects, external trainers, craft demonstrations, and field visits.
- A craft laboratory with space, facilities and raw materials.

RESOURCE MATERIALS REQUIRED FOR EACH INSTITUTION

1. Crafts mapping of India
2. Region-wise listings of craftspeople and crafts institutions
3. Monographs on crafts
4. Films and other visual material
5. Manuals/handbooks on different techniques, skills, materials
6. Separate criteria for craftspeople
7. Skills required to work in a group
8. Having/making a space for teaching motivation.
9. Re-introducing the technology and the product
10. Relationship between various government agencies

RESOURCE PEOPLE AND INSTITUTIONS

- National Bal Bhavan, in Delhi and its affiliated branches all over India
- Bharat Bhavan
  J. Swaminathan Marg
  Shamla Hills
  Bhopal 462 002
  Madhya Pradesh
  Tel: 91-755-540353, 540398
  Fax: 91-755-540353
- Bharatiya Kala Kendras, in Delhi and other major cities
- Calico Textile Museum
  Sarabhai Foundation, Opp. Underbridge
  Shahibag
  Ahmedabad 380 004
  Gujarat
  Tel: 91-79-2868172, 2865995
  Fax 91-79-2865759
  Email: sarafound@icenet.net
- CBT
- CCRT
- Central Cottage Industries Corporation of India Ltd.
  A, Barrack, Janpath
  New Delhi 110001
  Ph: 3326790 / 1577
  Fax: 3328334

- Indian Institute of Crafts and Design
  J-8, Jhalana Institutional Area
  Jaipur 302 017
  Rajasthan
  Tel: 91-141-2701203/ 2701504
  Fax: 91-141-2700160
  Email: iicd@datainfosys.net; gitika@sancharnet.in
  Web: www.iicdindia.org
- Craft Revival Trust (CRT)
  1/1 Khirki Village
  Malviya Nagar
  New Delhi 110 017
  Tel: 91-11-29545144 / 29541146
  Fax: 91-11-29545185
  Email: mail@crafrevival.org
  Web: www.craftrevival.org
- Crafts Council of India
  Vijaya Rajan, Chairperson
  GF "Temple Trees"
  37 Venkatanarayana Road, T. Nagar
  Chennai 600 017
  Tamil Nadu
  Tel: 91-44-24341456
  Fax: 91-44-24327931
  Email: craftscouncili@vsnl.net; craft@satyam.net.in
  Web: www.craftscouncilindia.org
- Crafts Museum
  Pragati Maidan
  Bharion Singh Road
  New Delhi 110 001
  Tel: 91-11-23371887/ 23371641
  Fax: 91-11-23371515
  Email: nhhm@vsnl.net
  Web: www.crafts-museum.com
- Dakshinchitra
  East Coast Road
  Muttukkadu
  Chenglepet District 603 112
  Tamil Nadu
  Tel: 91-4114-272603
- Dastkar, Society for Crafts and Craftspeople
  Ms. Laila Tyabji, Chairperson
  45 B, Shahpur Jat
  New Delhi 110 049
  Tel: 91-11-26495920/21, 26494633, 26495948
  Fax: 91-11-26495920
  Email: dastkar@vsnl.net; laila.tyabji@dastkar.org

Web: www.dastkar.org

- Development Commissioner Handicrafts and Handlooms Offices, New Delhi and other state capitals
  Government of India, Ministry of Textiles
  West Block No. 7
  R.K. Puram
  New Delhi 110 066
  Tel: 91-11-26106902, 26103562
  Fax: 91-11-26163085
  Web: http://www.texmin.nic.in

- Dilli Haat
  Sri Aurobindo Marg, Opp. INA Market
  New Delhi 110 023

- Eklavya Education Foundation
  Core House, Off C.G. Road
  Ellisbridge
  Ahmedabad 6
  Gujarat
  Tel: +91-79-6461629
  Fax: +91-79-6563681
  Email: eklavya@ad1.vsnl.net.in
  Website: http://www.eklavya.org

- Fabindia
  N-4 Ground Floor
  N-Block Market
  Greater Kailash Part I
  New Delhi 110 048
  Tel: +91-11-26212183 / 4 / 5
  E-mail: gklinens@fabindia.com; gk.delhi@fabindia.com

- Films Division
  Ministry of Information and Broadcasting
  Government of India
  New Delhi

- Government Design Cells
  Ministry of Textiles
  New Delhi and other state capitals

- Handicrafts and Handlooms Exports Corporation of India Ltd. (HHEC), New Delhi

- Indian National Trust for Art and Cultural Heritage (INTACH)
  Bhartiyam (near Humayun's Tomb)
  Nizamuddin
  New Delhi 110 013
  Tel: 91-11-24632269, 24632267, 24631818
  Fax: 91-11-24611290

- Indira Gandhi Rashtriya Manav Sangrahalaya (IGRMS) (National Museum of Mankind)
  Post Bag No. 2
  Shamla Hills, Bhopal 462013
  Madhya Pradesh
  Phone: 0755-2540319, 0755-2547589
  Fax: 0755-2545458, 0755-2542076
  Email: igmsbpi@mp.nic.in
- Jaya Jaitley
  Dastkari Haat Samiti
  6/105, Kaushalya Park
  Hauz Khas, New Delhi 110 016
  Tel: 91-11-23016035
  Fax: 91-11-23793397
- Khadi and Village Industries Corporation (KVIC)
  1st Floor, ITI Building
  Kasturba Gandhi Marg , New Delhi
  Tel: 91-11-23010221 Fax: 91-11-23012626
  Email: jsak@sansad.nic.in
- O.P. Jain
  Sanskriti Kendra
  C-6/53, Safdarjung Development Area
  New Delhi 110 016
  Tel: 91-11-26961757, 26963226
  Fax: 91-11-26853383
  Email: opjain@giasdl01.vsnl.net
- L.C. Jain
  D-5, 12th Cross
  Raj Mahal Vilas Extension
  Bangalore 560 080
  Karnataka
  Tel: 080-3344113
  Email: lcjain@bgl.vsnl.net.in
- Mapin Publications
  3, Somnath Road
  Usmanpura, Ahmedabad 3800 013
  Gujarat
- National Book Trust (NBT)
  A-5 Green Park, New Delhi 110 016
  Telephone: 91-11-26564020, 26564540, 26564667
  Fax: 91-11-26851795, 26854688
  E-mail: nbtindia@ndb.vsnl.net.in
  Website: www.nbtindia.org.in

- National Council of Educational Research and Training (NCERT)
  Sri Aurobindo Marg
  New Delhi 110016
  Fax: 91-11-2686-8419
- National Institute of Design (NID)
  Paldi, Ahmedabad 380 007
  Gujarat
  Phone: (079) 2663 9692, 2660 5243
  Fax: (079) 2662 1167
  e-mail: academic@nid.edu, pro@nid.edu, info@nid.edu
- National Institute of Fashion Technology (NIFT)
  (Ministry of Textiles, Government of India)
  NIFTCampus
  Hauz Khas, Near Gulmohar Park
  New Delhi 110 016
  Tel: (011) 26965080, 26965059
  Fax: (011) 26851198, 26851359
- National Museum
  (Ministry of Culture, Government of India)
  Janpath
  New Delhi 110011
  Tel. No. 91+011+3018415, 3019272/237
  Website: http://www.nationalmuseumindia.org
- SASHA, Calcutta
- SPIC-MACKAY, New Delhi
- Visva Bharati, Shantiniketan, West Bengal
- Weavers' Service Centres (WSC) Ministry of Textiles, in Delhi and other state capitals

RESOURCES

- Identify institutions
- Identify individuals
- Send out regular notifications
- Make inventory of usage
- Ensure authenticity
- Make listing of crafts
- Make listing of designs and motifs
- Compile oral histories of craftspeople
- Compile local resource book of motifs and designs (e.g. kolam, mandna, weaving and embroidery motifs)
- Explain meaning and significance of motifs and designs (e.g. alpana)

One's own resource (developed as part of classroom projects in school)

TRAINING FOR TRAINERS

It was agreed that selecting the right trainers is a crucially important factor. Without the right motivation and orientation, they could spell the failure of the project. Everyone had horror stories of art teachers killing the interest and initiative of potentially talented and creative students.

A new course in craft studies could not be successfully launched without first identifying suitable trainers/teachers for this new syllabus subject and giving them the appropriate training. The scheme should be tried out in a few schools, and then fine-tuned.

Areas that need to be planned and developed as part of the training module:

1. Identifying the components of training
2. Identifying career options
3. Listing resource materials and tools (educational)
4. Ensuring sufficient exposure
5. Identifying the components of the craft area
6. Networking/interning with resource institutions and individuals

EVALUATION

The Focus Group were unanimous that there should be no formal examination or marking, since in this creative area success or failure was partly dependent on the inherent skills and motivation of the individual child and the subjective value system of the teacher. *However, some form of regular evaluation should take place, which would also be self-evaluation of both the teacher and the course.* The child's effort, interest, and ability to handle materials should also be assessed.

The primary objective of this subject is to widen the child's horizons and enhance his or her skills and creativity. As Pulak Dutta said, "When a child is judged, the child loses joy." The framework and system of evaluation should not be totally rigid.

ARTS AND CRAFTS

It is the recommendation of the Focus Group that these two subjects, that is, arts and crafts, should be merged rather than bifurcated, and that Indian craft skills and materials should be used to encourage the creativity and artistry of the child in conjunction with sketching, painting, etc. Design is a very important component that should be taught as part of both subjects, with students using *craft* techniques to *design* their school environment, classrooms, uniforms, etc.

QUERIES AND CONCERNS

How will crafts education respond to the aspirations of students in the context of different regions and different social groups? Does it have the flexibility to provide space to marginalized voices? How will it deal with issues of diversity and commonality?

- What constitutes heritage in the context of crafts?
- Does the term 'heritage' send out wrong signals about a revivalist 'dead history' to young people?
- What is the meaning of craft in different social milieus—rural and urban?
- Should the study of heritage crafts be confined to traditional Indian crafts, or should it be extended to contemporary and non-indigenous techniques as well?
- How can one make the study of craft relevant and exciting to young people in urban areas?
- How can the practical experience of working with crafts be translated into textbooks and manuals?
- What is the form and role of the implementing agency that will pilot this new curriculum?
- How will the quality of teachers be determined?
- How will space be made in the curriculum for craft education?
- How will the lack of resources, such as costs of materials and equipment, be dealt with?
- How can the bureaucracy and the local administration be sensitized to the importance of craft education?
- Craft should not be hijacked for politico-cultural reasons.
- Craft should not be considered a second-class option for non-achievers.

> "Where do we come from? What are we? Where are we going?"
>
> PAUL GAUGUIN

- **The findings of the Dastkar case studies of Bal Bhavan and school excursions to the Crafts Museum, New Delhi lend weight to the argument that craft should be part of school education:** Craft **makes learning fun**, and can be used to teach children about subjects like history, geography, science, mathematics, etc.
- Children can ***experience* their cultural heritage** through the study of craft.
- Craft-based training can be **vocational**, and can be used to earn a **livelihood** later in life.
- Craft provides children a way to **express** what they feel without the need for words and without fear of punishment.
- Craft **brings out the inherent creativity** of children, especially if they are left free to decide what they want to learn and when.
- Harnessing creative talent is important since schools focus largely on academics. If a child is not good at mathematics, he or she should be given **other avenues to excel** instead of being made to feel like a failure.
- Learning is fun at Bal Bhavan largely because of the **non-formal methodology** adopted. If craft is incorporated into the regular school curriculum, this should be kept in mind.
- Employing traditional craftspeople to teach in schools will not only provide them

- Employing traditional craftspeople to teach in schools will not only provide them with **employment**, but also ensure that the teaching of craft is **true to India's rich cultural traditions**. For example, they can teach and explain Madhubani painting to children rather than extolling the benefits of cross-stitch embroidery.
- Teaching traditional crafts to children will ensure that these **traditions do not die out**. As one instructor said, "The time should not come when foreigners come to India to teach us about our own crafts."

Ideas for Implementation

- Set up craft laboratories in all schools.
- Make the study of crafts compulsory in junior and middle school, and offer it as an elective major in senior school, especially in crafts pockets.
- Children should work on projects to create local museums of archival crafts, relating these to local history, geographic conditions, flora and fauna, clothes and costumes, customs and rituals.
- Hold an annual fair, with children developing and selling products.
- Go on vacation excursions and attend camps in craft pockets, where children will work with craftspeople.
- Hold lecture-demonstrations by craftspeople, especially in cases where they are also parents of schoolchildren
- Use puppetry as a vehicle of instruction.
- Undertake exchanges and shared excursions between rural and urban schools, with children coming from traditional crafts backgrounds teaching crafts.

Inculcating respect for the craftsperson and fostering an appreciation of craftsmanship and skill are important aims of the recommendations.

Allied to this is our awareness that India's extraordinary and rich craft traditions and skilled and talented craftspeople constitute unique assets as the country searches for its own identity in a world that is becoming increasingly uniform, homogenized and technologically driven.

APPENDIX I

Modules of how a craft could be interpreted at various stages of a child's development:

A module for teaching a craft at different levels of the school system One afternoon a week

POTTERY LEVEL	CLASS ACTIVITY	RESOURCES REQUIRED	DOCUMENTATION
6–10 years	Using material, Coiling, pinching, free modelling	Crafts laboratory, clay, tools	shapes types Toys decorative patterns
11–14 years	Throwing on wheel forms and functions	Wheel, professional potter for demonstration	
15–16 years	Firing Glazing	Kiln	
16–18 years	Visits to potters' workshops, exhibitions, tile making Document local pottery traditions Document different vessels/pots Research literary references to pottery	Transport Visits to communities Resource person within school to coordinate cultural and creative inputs	
PAPER			
6–10 years	tear/patch and paste /collage Strip-weaving, rolling Decorative chains	Glue, paper (waste paper, tissue, cardboard) Methi powder, imli seeds Corn flour, chalk powder	History of paper making in India and China
11–14 years	Origami Papier mache Stenciling Printing	Gobar Paints Sawdust Screen-printing equipment	
15–16 years	Model making, paper sculpture Mobiles, kite making Flower making Puppets Masks Toys Coasters and mats Paper making Marbling	Pulper Buckets, water	
16–18 years school projects	Book binding Posters, chart making Map making Sets and costumes for plays Paper bags out of waste and newsprint		

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